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Telephone: Trafalgar 6171 (Private Branch Exchange)
Telegraphic Address:, "Zacatecas, Rand London."

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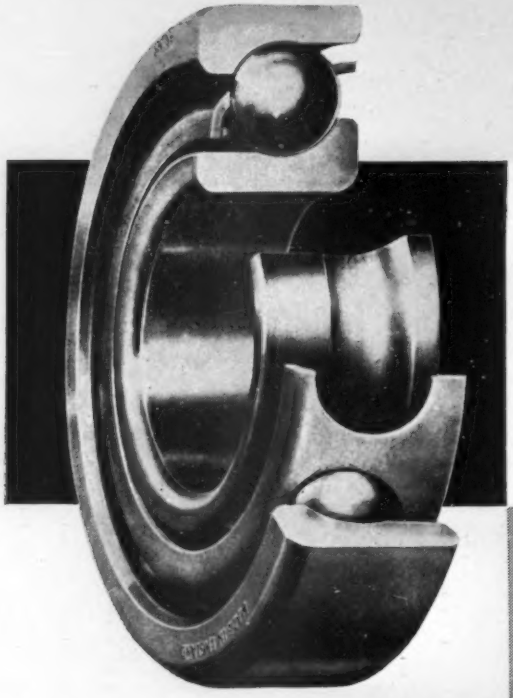

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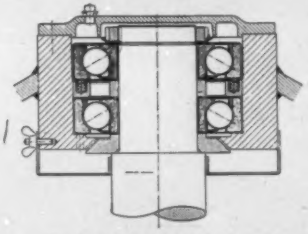

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IRON AND COAL
TRADES REVIEW

Vol. 181 September 23, 1960 No. 4,810

Price of Coal

NOBODY likes the increase in the price of coal —least of all, probably, the National Coal Board. In theory, and in practice, too, so far as immediate receipts are concerned, the board benefits financially from the increase, but it must be seriously worried about the long-term effects on the industry of a rise in price averaging 6s. 8d. a ton imposed at a time when sales in some sectors are still falling and in others are at best holding their own. Industrial consumers cannot be expected to approve of the increase, for no manufacturer likes to see his costs increased by outside influences, while private householders, if we are to believe our newspapers, are highly incensed about the whole thing.

In many consuming industries the increase is easily borne. The cost of fuel used in the manufacturing process is a very small proportion of the selling price in the case of a lot of goods and commodities sold in the home and export markets. Unfortunately for the coal industry, it is just these manufacturing concerns which yield most easily to the blandishments of the oil salesmen. In other instances, fuel is a heavy cost item in the manufacturing balance-sheet. The cost of manufacturing steel is closely tied to the price of fuel, and steelmakers are understandably concerned at having to pay an extra 6s. 1d. for coal, which is stated to mean 10s. on the cost of manufacturing a ton of steel. The increase is all the harder to bear in view of the fact that the steel industry has been striving hard to get its prices down, as well as its costs, and has succeeded to the extent that the selling prices of several products have been reduced in the last year or so. Steelmakers can be forgiven if they question whether the NCB has first given the fullest attention to reducing costs of production before seeking Government permission for the increase. The answer made is that the board has in fact reduced its operational and administrative overheads by some £50,000,000 during the last year.

Adverse comment takes the line that only a nationalized industry would raise its prices on a falling market; that the increases proposed are not fully justified by the higher costs which the NCB is called upon to bear; and that higher coal prices can only serve to discourage industry generally in the struggle to maintain price stability and check inflation.

The argument that a period of declining sales is no time to raise prices carries the implication that if the mines were still under private enterprise no such action would be contemplated. That is probably true enough. But the law of supply and demand works in more than one direction. The tendency is to raise prices when demand exceeds the supply and the National Coal Board can fairly point to the fact that there have been occasions since the war when it by no means extracted the fullest possible benefit from a scarcity market. Its moderation at such times—presumably dictated by the Government—helped to stem the rise in the cost of living. It is presumed also that the Government is concerned still at maintaining price stability, and in giving consent to the increase in coal prices, accepts the National Coal Board's argument that it is forced on the industry by the increased wage and other charges it has to bear.

The board, in arriving at an average increase of 6s. 8d., puts domestic consumers and the railways at the top of the list with an extra 10s. to pay, and the power stations, paying 5s. 1d., at the bottom. The electricity industry burns small coal which is relatively easy to mine in the form the power stations require. Moreover, the board has a lot of power-station coal in stock. To charge the electricity industry the smallest increase can be regarded as fair and reasonable. Domestic users and the railways use large coal, which relatively is more expensive to mine. The railways are steadily diminishing in value as customers of the coal industry, and the NCB may regard it as equitable that they should bear their part of the burden in full. Coke ovens pay 8s. 11d. more, gasworks 6s. 8d., iron and steel 6s. 1d., and other industrial users 7s. 1d.

It is in the general industrial section that the NCB fears most the competition of oil. But oil is encroaching steadily also in the domestic field, and it may be questioned whether the board is wise to increase the price of house coal by as much as 10s. The increase on some central-heating fuels is more than 10s., and the board is making a great effort to popularize central heating by solid fuel. Presumably the board has regarded it as its duty to apportion the increase fairly, but it might not have been amiss on this occasion to temper justice with a little expediency as well as mercy to the domestic consumer, who, to the extent that he is the ultimate purchaser of virtually everything made from or with the help of coal, will eventually carry the great burden of the overall increase anyway.

The coal industry has had what is called "a bad Press" in connection with this price increase,

despite the fact that it is the first since 1957. That was inevitable, but the criticism directed against the industry might well have been muted had the rise in price to the householder been less severe. It is a fault of the nationalized industries that they tend to be cold and impersonal in their relations with the public, basing their actions on facts and figures which are no more palatable because they are accurate and can be fully substantiated. A little psychology mixed with the figures and facts might make them more acceptable. A knowledge of psychology, as every salesman knows, is a great asset in selling.

Coal Price Increase and the Steel Trade

BY putting up the price of coal the National Coal Board was threatening a return of inflation, said Mr. Guy P. Philipson-Stow, chairman of Miles Druce & Company, Limited, holding company of iron and steel stockholders, of London, W.3, speaking at a Press conference on Wednesday. "I have no doubt the steel trade will do its very best to absorb coal prices," he said. "In recent years steel prices have risen less than coal, and with improved techniques the industry seems in the most amazing way to be able to absorb these increased prices of coal." He did not think there would be a rush to put steel prices up following the coal increase. He added: "Perhaps the more important thing from our point of view is if the coal price increase puts up rail freight charges."

Mr. Philipson-Stow told the conference that the group's turnover was now approaching £10,000,000.

The company is raising its interim dividend from the equivalent of 6¾ per cent. to 10 per cent. in respect of 1960, and forecasts a final of not less than 10 per cent. on the capital to be increased by a one-for-four rights issue. In 1959, a final of 10 per cent. made a total equal to 16¾ per cent., adjusting for an intervening one-for-two free issue.

Group profits, before tax, for the half-year to June 30, 1960, exceed £180,000, and maintenance of present trading conditions during the remainder of the year should result in a total profit of £350,000, the directors state. This estimate excludes the profits of Douglas Elliot & Company, Limited, Leeds, which was acquired in August. It is estimated that profits from this source from the date of acquisition to December 31, 1960, will be approximately £16,000.

The rights issue is being made as a result of the purchase of Douglas Elliot & Company, and also to finance the continuing expansion.

Scientists Discuss Metals at Sheffield University

MORE than 200 scientists, physicists, and metallurgists from many parts of the world attended a three-day conference which began on Tuesday at Sheffield University, organized by the department of metallurgy. The conference discussed a group of four "difficult" metals.

There was a strong delegation from the United States, and Russia sent six scientists.

Personal

Mr. F. G. MITCHELL, chairman of Mitchell Engineering, Limited, contracting engineers, etc., of Peterborough, and Mrs. Mitchell, celebrated their golden wedding anniversary last week.

Manager of the sales office for Sheffield and district of the United Steel Companies, Limited, Mr. HUGH CAMERON, of Millers Bank, Hathersage (Derbyshire), has been appointed a Justice of the Peace.

Mr. ALAN T. CARTER, chairman and managing director of Thomas Staniforth & Company, Limited, edge tool makers, of Hackenthorpe, near Sheffield, and chairman of the Edge Tool Manufacturers' Association, has been appointed a magistrate.

Ald. AARON WALTON, a retired shipping superintendent and formerly employed by the Northern (N&C) Divisional Coal Board is to be made a Freeman of the Borough of Blyth (Northumberland). He has been Mayor of Blyth on seven occasions, and a member of the council for 45 years.

Head of the office administration department of Imperial Chemical Industries, Limited, the EARL OF COURTOWN, has been elected president of the Institute of Office Management in succession to Viscount de L'Isle. He has been a member of the institute for 25 years and before the war was a member of the council.

For his paper—"The Cascade System"—describing a universal method of deriving pneumatic, hydraulic, and electrical circuits, Mr. A. M. SALEK, sales manager of Martonair, Limited, Richmond (Surrey), has won the fourth prize of $100 in the annual international fluid power contest sponsored by the US publication, Applied Hydraulics and Pneumatics.

Mr. D. P. CARR, general manager of the trackwork division of Edgar Allen & Company, Limited, Sheffield steelmakers and engineers, left for Buenos Aires on Monday on a two weeks' tour of the Argentine railways and tramways. He will meet executives and engineers of both transport systems to discuss the progress of current contracts and investigate traffic conditions with a view to developing further business.

Miss MARY BERRY, principal of the business training college associated with Newton, Chambers & Company, Limited, Thorncliffe, near Sheffield, has retired. Retirement gifts from managers at Thorncliffe and past and present students of the college were presented by Mr. P. J. C. BOVILL, Master Cutler and managing director of Newton, Chambers. Miss Berry, who is the first woman national chairman of the National Association for Education and Commerce, is succeeded at the college by Mrs. I. A. B. FLINT, of Doncaster.

Head Wrightson Stockton Forge Change of Name

BECAUSE of the greater diversification and extension of its activities since the company was formed 60 years ago, Head Wrightson Stockton Forge, Limited, Thornaby-on-Tees (Yorks), a subsidiary of Head Wrightson & Company, Limited, has changed its name to Head Wrightson Stockton, Limited.

The company at present designs and manufactures specialist equipment for the mining, iron and steel, chemical, and allied industries, and its services in the constructional field, including light alloy structures, vessels, bridges, tanks, etc., are used extensively over-

Steel Stocks

STEADY RISE FOR ALL PRODUCTS

NOW that the results of the census into consumers' and merchants' stocks of steel taken by the Iron and Steel Board at the end of June are almost complete it is possible to see that the preliminary estimate given last month was a little too optimistic. Nevertheless, the indications are that stocks held by users rose during the second quarter by 210,000 tons and that the rise of 240,000 tons for the first quarter was rather more than was originally estimated. Over the first half-year the rise amounted to 450,000 tons (14 per cent.) which confirms the assessment made last month.

The rapid increase in stocks, the Iron and Steel Board states, occurred mainly at the larger privately-owned firms where tonnages rose by 15 per cent. and 10 per cent. in the first two quarters, respectively. Stocks held by smaller private firms and by the public organizations, although showing an upward trend, rose more slowly.

Steel sheet showed the most notable increase—stocks rising by no less than 153,000 tons, or 36 per cent., in the first half of 1960. At this rate of increase stocks would be doubled within 18 months.

Deliveries of Steel Sheet

Consumers' stocks of sheet dropped to 415,000 tons last September and have risen in the two 1960 quarters to 503,000 and 574,000 tons, respectively. The lowest point reached for stocks of plate was in the last quarter of 1959—563,000 tons—and for this year the provisional quarterly figures are 584,000 and 603,000 tons. The September quarter was the lowest for stocks of tinplate—118,000 tons—and these have now risen to 134,000 and 148,000 tons, respectively. Stocks of other steel products, down to 2,001,000 tons last September, have climbed to 2,126,000 and 2,231,000 tons, respectively for the first two quarters of 1960.

Merchants' stocks were lowest, at 3,474,000 tons in the last quarter of 1959 and are now estimated at 3,912,000 tons.

Deliveries of steel sheet from the continuous mills show a steady rise throughout the first seven months of the year. Among the other products all except colliery arches show substantial increases, compared with 1959 when demand generally was slack. In addition the light re-rolled products such as wire rod, ferro-concrete bars, light sections, and strip all show substantial increases compared with 1957, the previous most active year.

The increased output of the light re-rolled products has meant a heavy demand for billets and there has also been a growing need for billets for drop forgings. Increasing supplies have been made available from existing billet mills and new mills recently installed, together with a contribution from the capacity which would normally produce rails and other heavy sections.

The weekly average deliveries of non-alloy billets for the first eight months of 1957 stood at 110,500 tons. After dropping to 91,000 tons in 1958, it rose to 100,400 tons last year and is 131,000 tons this year. Alloy billets at 11,000 tons weekly average for the first eight months of 1957 dropped to 10,800 tons in 1958, 10,400 tons last year, and have now shot up to 14,500 tons. The total deliveries of billets for the same comparable periods has ranged from 101,800 tons in 1958 to 145,500 tons this year.

By products the gross deliveries of finished steel for the January-July period, 1960 (comparable 1957 figures in parentheses) are as follow:—Plate, 51,800 (54,400) tons; heavy rails, sleepers, and fishplates, 10,100 (13,700) tons; other heavy rolled products, 53,200 (52,900) tons; colliery arches and light rails, 8,200 (11,000) tons; wire rods and other rods and bars in coil, 29,000 (22,300) tons; ferro-concrete bars and rods, 11,900 (8,600) tons; light sections and bars, 60,400 (53,800) tons; strip, 44,500 (30,100) tons; sheet (from continuous mills), 48,100 (33,200) tons; sheet (from other mills), 6,500 (8,900) tons; tinplate, terneplate, and blackplate, 24,600 (21,200) tons; tubes, pipes, and fittings, 26,900 (24,100) tons; all other products, 23,200 (25,100) tons; total net deliveries from UK mills (after deducting material for conversion into other products already listed), 343,600 (311,700) tons.

Vickers Shows Half-year Sales and Profits Rise

VICKERS, Limited, increased its group sales to £75,670,000 in the six months to June 30, 1960, compared with £73,030,000 in the corresponding 1959 period, and the net profit rose from £1,780,000 to £2,490,000. The full year's figures for 1959 were £155,540,000 and £4,930,000, respectively. So far as the second half of the year is concerned, the directors state, business remains active and it is estimated that profits are running at about the same level as in the first half.

Orders on hand at June 30 last totalled £286,000,000 compared with £295,000,000 at June 30, 1959, and £282,000,000 at December 31, 1959. The interim dividend is maintained at 2½ per cent. A total of 10 per cent. was paid for 1959.

DELIVERY of 62 steel ropes, each weighing 14 tons and 2,200 ft. long, which will form the main suspension cables of the new Tamar Bridge, near Plymouth, began from the Doncaster works of British Ropes, Limited, last weekend. The contract, worth £200,000, involved using about 4,500 miles of wire weighing a total of 850 tons.

Passing Thoughts . . .

IT was wickedly irresponsible for the Federation of British Industries to put out the sneer that American coal can be delivered to South Wales steel mills at £1 a ton cheaper than coal from Monmouthshire pits. Even if the figure is correct—and we should want to see much more evidence before accepting it—the FBI is generalizing from a freak case. The FBI members fattened on cheap coal when times were good. Now they squeal when they have to pay an economic price.—Reynolds News.

It is interesting to read that last year we sold 5,000,000 *tons of coal abroad at prices which brought in* £7,000,000 *less than if the coal had been sold on the home market.*—JOHN GORDON, *in the Sunday Express.*

To say, as the Coal Board does, that because costs have risen as a result of stocking unsaleable coal, there is now no alternative to raising prices, and thus making more coal unsaleable, is a description of management's self-defeat rather than any rational explanation of a decision . . . If it is the NCB's considered opinion that the market will never improve, then it should apply for a subsidy to meet the cost of keeping its uneconomic pits running.—The Observer.

Coal goes up in price . . . Maybe it will mean the end of the open fire. But our children probably won't want that anyway.—News of the World.

The truth is that the coal industry is coming to the parting of the ways. Either the industry must concentrate production on mines from which coal can be taken at competitive costs . . . or wages and salaries in the industry must be governed by the rates that the industry can pay and remain competitive.—Glasgow Herald.

The only hope now seems to be with the new NCB boss, Mr. Alfred Robens. It may be the last chance.—Sunday Dispatch.

Would it not be better, instead of putting up the price of coal, to subsidize it? Such subsidy must come out of the taxes, and so out of our pockets; but on the other hand it would not put up the price of everything into the making of which coal inevitably enters.—Letter in the Daily Telegraph.

Two courses are open. One is for the Government to bear at least the interest charges involved in stocking coal . . . The other ought to be a much more ruthless progress with rationalization.—Birmingham Post.

To raise prices at a time when sales are falling and one's main competitors are busy cutting their own prices is, to put it mildly, a somewhat eccentric business practice . . . If coal is to compete the board must be prepared to close down marginal pits more drastically and to show greater price flexibility. Its present price policy is leading it up a blind alley.—Financial Times.

The latest increase in the price of coal is as exasperating as it is astonishing. If the new trend continues, coal may soon price itself out of the market.—Western Mail.

If the coal industry cannot bring itself to adopt a sales policy to challenge all comers, its continued decline is inevitable. Price inceases can but hasten the decline.—The Guardian.

It is fair to ask the Government to help the coal industry over its difficulties by taking over a share of the burden from the past, such as the interest charges which fall upon it.—Daily Herald.

Another wage claim before the rationalization of production has been achieved could put coal altogether out of the reckoning as an important fuel. It would have to surrender the whole field to its rivals.—Sheffield Telegraph.

The difficulties of the actual situation are enormous, it is possible to see now in retrospect that the Government's piece-meal approach to national fuel policy has failed.—Scotsman.

The householder, asked to fork out another 10s. a ton, will puzzle over the Coal Board's 30,000,000 unsold tons and think it's a stupid way to run a business. So it is—unless the aim is to cut your own throat.—London Star.

The price goes up. The quality goes down. The fire goes out.—Letter in The Times.

Monsanto Forms Spanish Plastics Company

SPANISH company has been formed by Monsanto Overseas S.A., a wholly owned subsidiary of Monsanto Chemical Company, St. Louis, US, in association with Aiscondel S.A., Barcelona. The new company, Monsanto Iberica S.A., is one of the first companies to be formed under a recent Spanish law which governs foreign investment and permits equity up to 50 per cent. by foreign companies.

Monsanto Iberica is already in production, having acquired an Aiscondel subsidiary plant near Barcelona which produces plasticisers, stabilisers, and Lauroyl peroxide for the plastics processing industry. A new plant is to be built at Monzon to make calcium carbide, acetylene, and acetylene derivatives.

NCB Softens the Blow to Merchants

IT has been announced that the National Coal Board has agreed to make rebates to assist merchants in carrying out the recommendation of the Domestic Coal Consumers' Council that orders placed by householders up to and including September 14 (the day before the NCB announced its price increase) but not delivered by that date should still be met at the old price.

The board will pay 10s. a ton to merchants on the amount by which the tonnage supplied to householders at the old price against outstanding orders placed before September 15 exceeds their stocks of domestic coal (including boiler fuel other than coke) at September 18 plus tonnage advised to them at the old price but not received by September 18.

DEVELOPMENTS AT Newcastle-upon-Tyne by Aveling-Barford, Limited, makers of road machinery, earth-moving equipment, etc., of Grantham (Lincs), will mean trebling the numbers employed at the Tyneside works. Present premises are to be given up and new premises which will be finished early next year will provide accommodation for research and the development, design, and manufacture of Aveling-Barford products.

Against and For

CRITICISM OF NCB's COAL PRICE INCREASES

COMMENTING on the National Coal Board's announcement of increased prices for solid fuel, the Federation of British Industries says in a statement that with the increase in the price of coal it would now be £1 per ton cheaper to import Virginian coal to the Port Talbot steelworks of the Steel Company of Wales, Limited, than to use coking coal from the adjoining Monmouthshire coalfield. The FBI maintains that the example set by a major State-owned industry can only serve to discourage industry generally in the struggle to maintain price stability and check inflation.

Describing the increase as "a violent shock," the federation stated that industry had yet to be convinced that the increases proposed were fully justified. The cost of implementing the recent wage arbitration award only accounted for about one third of the additional revenue which the NCB hoped to raise. Some of the other extra revenue seemed to be for non-recurring items, such as terminal losses in closing collieries and the loss incurred by stocking coal.

In reply, a Coal Board spokesman pointed out that for 10 years the board supplied British industry with coal at less than world prices. During that time there were no suggestions that coal should be imported into this country—except of course at the Coal Board's expense.

FBI Wants "Best of Both Worlds"

"The Federation of British Industries seems to want the best of both worlds," the Coal Board spokesman continues. "It has carefully chosen an isolated case on which to base its claim, but virtually the whole of our output will still be sold at lower prices than those at which coal could be imported."

A suggestion that the NCB accounts should be subjected to public audit so that efforts could be made to economize and increase efficiency was made by Lt.-Col. G. H. Napier, secretary of the East Midlands branch of the National Union of Manufacturers. He too saw the increase as another blow to the Government's policy of keeping prices stable and foresaw that a lot of consumers of solid fuel would turn to oil.

The occasion would not have been complete without a statement from the arch-enemy of nationalization generally and the NCB in particular, Mr. Gerald Nabarro, Conservative MP for Kidderminster. It came on Saturday. Mr. Nabarro said the increases represented a disastrous policy and might best be described as "how not to sell more coal."

Oil had successfully competed with coal over the past year and now that the NCB had taken the unwise step of putting up the prices it was clear that its share of the fuel market would diminish and that more householders everywhere would tend to swing to oil. Industry would do the same.

From the political point of view it was very dangerous because the Government, having held prices stable for more than two years, would now be confronted by an increase in coal prices with consequential increases in the cost of gas, coke, electricity, and transport (though to a lesser extent). This would prove highly inflationary and damaging to the Government.

One voice was raised in an appeal for a fair and rational attitude towards the situation which has forced the Coal Board to raise prices. It was that of Mr. John A. Raven, director of the British Coal Exporters' Federation, and his letter to The Times was given prominence on Monday.

"Many of us in the industry, though not within the board, consider these criticisms ill-founded and foresee grave damage to the already weakened self-confidence of an industry on which the country is bound to depend for its basic fuel and power need for at least the rest of this century.

"Little publicity," he points out, "has been given to the fact that the real cost of coal, even including recent wage increases (awarded and consequential) and a reduction in hours, has fallen during the last three years. The bulk of the £60,000,000 which the board seeks to raise by its increases cannot be related to the real costs of current coal production. It results from the board's desire to begin clearing its books of the accumulated deficit and from its policy of stocking coal instead of scrapping miners."

Past deficits, Mr. Raven maintains, were simply the result of Government interference to depress inland prices—against the board's own inclination—over a period of years in order to avoid political criticisms stemming from increases in the cost of living index. Stocks resulted from the NCB policy of phasing the closure of pits and cutting highly profitable open-cast production—a policy no political party had yet opposed.

Public criticism, therefore, ought to be directed primarily against the Minister and his predecessors for intervention to depress coal prices in the past, Mr. Raven said, and against both political parties for the support they had so far given to the humanitarian policy of controlling pit closures and reducing open-cast output.

"In fact the nation can put the Coal Board into the witness box, but it must put the Government and Opposition front benchers into the dock."

Finally Mr. Raven suggests that the board is "not obliged by statute to maintain sales—and so production—by conniving at a long-term indebtedness which conceals the real cost of running an industry for the Government instead of the shareholders."

GRIMETHORPE COLLIERY INSTITUTE came third in the annual open championship brass band contest at Belle Vue, Manchester, on Saturday.

MEMORIAL SERVICE

Mr. Barrington Hooper

A MEMORIAL service to Mr. Barrington Hooper, chairman of Industrial Newspapers, Limited, was held at the Church of St. Bride, Fleet Street, London, on Tuesday. The full choral service was conducted by the rector, the Rev. Cyril Armitage. Many of Mr. Hooper's friends and acquaintances reflecting his wide sphere of interests in industry, commerce, and social life were present at the service.

Mr. Hooper, who died on September 2, was 75. He founded Industrial Newspapers 34 years ago and was its first managing director. He became chairman of the group in 1955 and was also chairman of the recently formed Industrial Newspapers (Fuel & Metallurgical), Limited, publishers of IRON AND COAL.

An Expert Publicist

The address was given by Mr. F. H. Harley, editor of IRON AND COAL and a director of Industrial Newspapers (Fuel & Metallurgical), who not only has been associated in his professional capacity with Mr. Hooper and the company for more than 30 years, but was also a close friend and colleague, particularly in assisting in organizing the annual conferences of the National Association of Colliery Managers, of which Mr. Hooper held the rare distinction of honorary membership.

Mr. Harley spoke of Mr. Hooper's early career, his undoubted genius as a publicist, his work in that field for the War Loan Tank Campaign and the Victory Loan and Food Economy campaigns of the first world war, which earned for him the honour of CBE, and later—in 1924—his little-realized but nonetheless outstanding success as controller of publicity for the British Exhibition at Wembley, and then the skill and expert knowledge he brought to bear in the sphere of trade and technical journalism.

The characteristics which endeared Mr. Hooper not only to his staff, but his friends and acquaintances were summed up briefly by Mr. Harley in the words: "That in business matters he was shrewd and astute goes without saying. But he climbed up on nobody's back. He was of a kindly and generous nature. He was a good employer; just, sympathetic, tolerant, and understanding. . . . He never stood aloof from his staff; he regarded himself as one of them, and in times of personal need no one ever sought his advice and help in vain."

To this tribute many in the great industries of coal and steel who knew Mr. Hooper have added others, for he was not content to be just a publisher of trade and technical journals, but he went out of his way not only to be well-informed about their progress and problems, but to serve in any way he could the many trades and industries represented by Industrial Newspapers.

In addition to members of Mr. Hooper's family, his fellow directors and the staff of Industrial Newspapers, those present at the memorial service included the following:—

Mr. F. H. Ayling, Mr. J. A. Benjamin (representing the Coal Merchants' Federation of Great Britain), Lady Bryan (also representing Sir Andrew Bryan), Mr. Jack Crump, Mr. G. R. Curry, Mr. R. E. Dangerfield, Sir Guy Harrison, Mr. F. R. Lewis, Mr. Lionel Locket (also representing the Coal Trade Benevolent Association), Mr. Quentin Lumsden, the Hon. R. G. Lyttelton (also representing the Iron and Steel Institute), Mr. L. R. Mason, Sir Frederick and Lady Minter.

Mr. John Oldham, Mr. D. Cherry Paterson, Mr. Gavin Paterson, Mr. W. V. Sheppard (also representing Sir James Bowman, Mr. E. H. Browne, and the National Coal Board), Mr. Digby Sperring, Mr. G. R. Webster (representing the Institute of British Foundrymen), Mr. K. M. Whitworth.

Mr. H. H. Wilson, president of the National Association of Colliery Managers; Mr. H. U. Carr, Mr. E. L. Evans, Mr. Dean Harrison, Mr. E. J. Kimmins (also representing Mr. H. E. Collins and Mr. H. A. Longden), Mr. Robert Williams, and Mr. W. Sharpe (past presidents of the National Association of Colliery Managers), Mr. L. Atkinson, Mr. H. Flesher, Mr. W. A. Machin, Mr. S. A. McKee, Mr. C. F. Palmer, Mr. J. T. Robson, and Mr. J. Whittaker (members of the council of the NACM).

Mr. A. S. Douglas-Bate, Mr. J. W. Butler (also representing Mr. W. P. Newman and Mr. M. J. Glenny), Mr. J. W. Gardom, Mr. L. S. Harborne, Mr. Charles Hervey, Mr. F. E. Godfrey, Mr. George Hewson, Mr. F. E. Laney (also representing Mr. M. F. Higgins and Mr. B. A. Higgins), Mr. A. J. Long (representing Mr. Richard Miles), Miss M. Maurice, Mr. Hubert Merrick, Mr. F. Salisbury, Mr. F. Arnold-Wilson (also representing Mr. H. J. V. Williams), and Mr. Vernon H. Willey (representing Mr. Allen E. Gilbert).

There were also present many other representatives of the trades and industries and associated organizations covered by the publications in the Industrial Newspapers group.

Babcock & Wilcox Agreement with "Vecor"

LONG-TERM purchasing agreement has been concluded between Babcock & Wilcox, Limited, and Vanderbijl Engineering Corporation, Limited, Pretoria (Vecor), under which Vecor will purchase the Vereeniging works at present owned and operated by Babcock & Wilcox of Africa (Pty), Limited, valued at about £1,000,000. Babcock & Wilcox is to acquire 400,000 ordinary shares in Vecor in part payment for these assets. At the same time Vecor will take a 25 per cent. holding in the African company of Babcock & Wilcox.

By these arrangements, the African company of Babcock will benefit from the increased scope of manufacturing facilities, and Vecor will benefit by the immediate availability of further manufacturing capacity. When the agreement becomes effective at the end of 1960, there will be an exchange of directors between Vecor and the African company of Babcock & Wilcox. The agreement is subject to the approval of the UK and South African Treasuries.

INITIAL CONTRACT, worth £3,500, for 105,000 subminiature electrolytic capacitators, has been placed with Swindon Condenser Company, Limited, by Sony, of Shannon, Eire, a subsidiary of the Sony Corporation, of Japan.

SIX BELLS EXPLOSION

Inquiry Opens at Newport

INQUIRY into the explosion on June 28 at the Six Bells Colliery, Abertillery (Mon), as a result of which 45 miners lost their lives, opened at Newport on Monday. Opening the inquiry, HM Chief Inspector of Mines, Mr. T. A. Rogers, said its purpose was to establish facts that might help the industry to avoid similar accidents in the future. "We should avoid any semblance of prosecution and defence," he advised.

Allegations of mistakes and regulations unobserved were made on the second day of the hearing. These referred in the main to miners' safety lamps, searches for contraband, and methods of shotfiring. Considerable cross-examination by Mr. E. Ryder Richardson, QC, for the National Union of Mineworkers, dealt with contraband and shotfiring and he indicated that more evidence would be brought on these matters.

Descriptions of the first effects of the explosion were given by a number of witnesses on Monday. Mr. H. J. Legge (45), a fitter, said that he was sitting near electrical transformers near the mouth of the old T district. There was a rush of hot air and dust, a feeling of burning on his face, and great difficulty in breathing. He gained the impression that the electrical transformer had blown up.

Evidence of Gas

Questioned by Mr. C. Leigh, HM Inspector of Mines for the Cardiff District, South Western Division, Mr. Legge said he had experienced heating of rollers on bearings on conveyors. It had not been severe, but he knew that water had been run on to bearings to cool them. Mr. C. J. Lewis (32), another fitter, also said he remembered seeing a hot bearing on a face conveyor, but it was a long time before the accident. He had known of no sparking in the explosion district.

A deputy responsible for the inspection of airways at Six Bells, Mr. S. Holland (58), told of going to investigate the explosion and finding a fall of roof. Later he went back with a small party of officials and found evidence of gas. He had been into the district about five weeks before because officers of O 18 area were experiencing fluctuations of gas. Previously ventilation had been "tightened up," but the fluctuations had persisted and he was trying to find the cause. He found 1¼ per cent. of gas and slight adjustment had been made to the Venturi system. At the main gate he had found 3 per cent. of gas near the roof. Improvements were made.

He agreed with Sir Andrew Bryan, representing the National Association of Colliery Managers and the British Association of Colliery Management, that the gas which was being given off was diluted and that he had found nothing in the general body of the air.

Mr. Bernard Rees (52), miner and chairman of the colliery lodge, said he was aware that workmen in the No. 5 pit were not prepared to carry out searching for matches, cigarettes, and other contraband. He knew that in the O 18 section, if a shot had not been fired, one detonator and 1 lb. of explosive were unaccounted for after the explosion. In answer to Mr. G. G. Baker, QC, for the National Coal Board, Mr. Rees said that he had been told that shotfiring had been stopped in the O 18 main, because there had been gas in that main. The men were apprehensive that there might be liberties taken in firing in the O 18 area. He told Mr. Baker that he had heard that workmen in No. 5 pit were not prepared to search. It was a question of pay. The new manager wanted to have the payments in accordance with the agreements and not in accordance with payments made previously.

Mr. Ryder Richardson, for the National Union of Mineworkers, put to Mr. Rees the minutes of some of the colliery safety committee meetings. One referred to Mr. Rees's concern about the safety of everyone working in the pit. He was quoted as having said that some of the workmen were rather concerned that some officials were shotfiring, but others were not, because of the presence of gas.

Mr. W. Nash (57), a deputy, said he was in charge of O 18 section on the night shift before the explosion. In reply to questions, he said that the Venturi equipment for clearing gas with compressed air was not in action in the O 18 section for some time on the night of the explosion. He denied that the Venturi was not working for most of the shift. The Venturi could not have been off for more than half an hour. Asked if he had drawn the manager's attention to the fact that he had refused at times to fire shots, Mr. Nash said he had not included his refusal in written reports, but he had openly expressed his opinions at the colliery.

When the inquiry continued on Tuesday, Mr. E. Price, a deputy, denied that the system of searching for contraband was not being enforced. He had been searched by the banksman before going down. The mine was not dangerous, although there was some gas in some parts. He found some in various places on the afternoon shift before the disaster.

HM District Inspector of Mines for the division, Mr. W. B. Powell, said that the deputies' reports over six to seven months were in general good. Regarding searching for contraband, the records of No. 5 pit up to May 5 were not in accordance with the requirements. Since May 5 no record had been taken at all.

On Wednesday a miner, Mr. W. Jenkins (55), said he had known shotfirers in No. 5 pit use any material for safety packing in shot boring, instead of stone dust, the correct filling. Asked if he knew whether it was right or wrong to fill the packing bag with coal dust, he replied: "You did what you were told down there." Sir Andrew Bryan asked him: "You are simple enough to do something that is wrong, just because you are told?" Mr. Jenkins replied: "You are told what to do, and there you are."

Appointments

Mr. John Bolton Becomes Director of BSFA

MR. JOHN BOLTON, at present secretary of the British Steel Castings Research Association, has been appointed director and secretary of the British Steel Founders' Association as from October 1.

MR. JOHN BOLTON

He succeeds Mr. Robert Barber, who has resigned to take up an appointment as sales director of George Blair & Company, Limited, engineers, of Tow Law (Co. Durham), and Springfield Steel Company, Limited, Glasgow, its subsidiary, from that date. Mr. Bolton, who was born at Letchworth in 1917, was before the war a member of the editorial staff of the *Foundry Trade Journal*, an associated publication of IRON AND COAL. From 1939 to 1948 he was acting secretary of the Institute of British Foundrymen. He became secretary of the British Investment Casters Technical Association in 1958.

Mr. C. M. STOCH has been appointed assistant director of research of the British Steel Castings Research Association. Mr. K. KNAGGS, a deputy head of the association's steelmaking section, has been appointed head of that section. Mr. E. R. SMITH has been appointed secretary in place of Mr. BOLTON, and Miss C. M. G. MCBROOM becomes technical secretary. The appointments take effect from October 1.

Mr. STEPHEN BRAGG, a 36-year-old Cambridge graduate, who is a rocket engineer, has been appointed chief scientist of Rolls-Royce, Limited.

Mr. ERNEST W. HANCOCK has joined Production Engineering, Limited, managements consultants, of Birmingham, as an associate consultant.

Mr. ADAM BLAIR, formerly chief electrician at Bowhill Colliery (Fifeshire) has taken up a teaching appointment with Inverness Education Committee at its new technical college.

Dr. J. S. ROWLINSON, senior lecturer in the University of Manchester, has been appointed to the University Chair of chemical technology, tenable at the Imperial College of Science and Technology.

Mr. GEORGE A. SMITH has been appointed commercial executive of the electronic and equipment group of the Plessey Company, Limited, radio, electronic, and instrument makers, of Ilford (Essex).

Mr. P. BLANDFORD has been appointed technical sales manager for Ferodo, Limited, manufacturers of brake linings, of Chapel-en-le-Frith (Derbyshire). Before joining Ferodo he worked with Vickers-Armstrongs (Aircraft), Limited, at Weybridge.

Mr. STANLEY JESSOP is relinquishing his appointment as sales manager of Fredk. Town & Sons, Limited, Halifax, and Woodhouse & Mitchell, Brighouse, both subsidiaries of Thos. W. Ward, Limited, Sheffield, at the end of the month. He is rejoining the parent company on special duties in connection with its engineering activities in Scotland.

British Oxygen to Make Rights Offer

DIRECTORS of the British Oxygen Company, Limited, have decided to raise some £12,270,000 by way of a rights offer. Ordinary shareholders are to be offered one 5s. ordinary share at 18s. for every five held on September 15. The issue will not be underwritten. Shareholders are informed that expected capital expenditure of £28,000,000 announced by Mr. J. S. Hutchison last March has now increased to around £40,000,000. The extra money is needed for production capacity to supply industrial gases in large quantities to the steel industry and other users and for general development.

Provisional allotment letters are expected to be posted on October 21. A first instalment of 10s. per share will be payable on acceptance on November 16 and the final instalment of 8s. on January 25. The new shares will not rank for the final dividend for the year to the end of this month.

Group trading profit for the year is estimated at £9,400,000, against £8,587,144 in 1959. The directors expect to recommend an unchanged final dividend of 10 per cent., making a total of 16 per cent. for the year and to maintain that rate on the increased ordinary.

"600" Now Official Trade Mark of George Cohen Group

REGISTRATION of the figures "600" as the trade mark of the George Cohen 600 Group, Limited, London, W.12, has been sanctioned by the Trade Marks Office. It is one of the very few numbers which the Board of Trade has permitted to be registered. Evidence is required that purchasers of goods being marketed would associate the figures with the trading activities of the concern seeking to register the mark, and this evidence was supplied by some hundreds of firms in the case of George Cohen.

The "600" mark derives from the transfer in 1876 of the headquarters of George Cohen Sons & Company, Limited, to 600, Commercial Road, London, E.14. Over the years the habit of talking of "going to 600" spread through many concerns in the metallurgical and engineering industries, and in the early 1920s the figures were first used as a mark on goods and publicity. "There are, mercifully, not 600 companies in the group. Today there are 35," said Mr. N. G. P. Boswood, company secretary.

Steel, Peech & Tozer Mill's New Record

NEW output record of 25,186 tons of ingots rolled was set up last week in the cogging mill at the Rotherham works of Steel, Peech & Tozer branch of the United Steel Companies, Limited. The previous record—24,424 tons—was set up a few weeks ago.

An output of over 25,000 tons in one week represents more than 5 per cent. of the country's total production. A congratulatory message has been sent to the mill by the firm's general manager, Mr. T. S. Kilpatrick.

STANLEY MOTORS, LIMITED—Mr. W. A. Huxtable has been appointed a director.

Company News

CHARLES CHURCHILL EXPANSION

Machine-tool Makers Acquires Newcast Foundries

MACHINE-TOOL makers, Charles Churchill & Company, Limited, Birmingham, has acquired control of Newcast Foundries, Limited, Newcastle-under-Lyme (Staffs), which has supplied castings to the Churchill group for many years. The acquisition has been made, states Mr. Ralph Gabriel, managing director of the Churchill group, to meet the group's growing production demands for a plentiful supply of high-quality grey iron castings and the need for it to have its own foundry.

Mr. Gabriel adds that plans are already being prepared for a major expansion scheme which, it is intended, will double the production of the plant within the next 12 months. The sales policy of Newcast Foundries, as a member of the Churchill group, will remain unchanged.

The existing management of Newcast Foundries will continue, with Mr. C. Reynolds as commercial director and Mr. R. Lewis as technical director.

Hardypick Chairman's Word of Advice

BROADCASTING plans for future developments "is not necessarily nor in fact always in the best interests of the shareholders and the less said in this direction the better," states Mr. Thomas G. Jameson, chairman of Hardypick, Limited, makers of mining tools, coal and rock drilling machinery, etc., of Sheffield, in his annual review.

He reports brisk current trading and better prices for many specialities and hopes for a "still more favourable" balance-sheet at the end of the current year.

As has been reported, the directors have advised rejection of a bid of 30s. for the £1 preference and 65s. for the £1 ordinary from Laycock Engineering, Limited. The net profit of Hardypick of £17,210 (£10,012) for the year to June 30, 1960, is in line with the figures given in the board's circular advising rejection of the bid. The final dividend, as then indicated, is to be 17½ per cent. making 25 (20) per cent.

The directors of Hardypick announced this week that a new approach has been made to the company's advisers by an independent party, who has deposited an amount in excess of that offered on behalf of Laycock Engineering in a bank in the name of such party's solicitors. Holders are advised to take no action for the time being. They will be notified of further developments as soon as possible.

GENERAL REFRACTORIES, LIMITED—To conform with modern practice, the company is to introduce payment of an interim dividend. A single payment of 20 per cent. has been made for the past three years.

KETTON PORTLAND CEMENT COMPANY, LIMITED, Sheffield—The company, which is controlled by Thos. W. Ward, Limited, is planning increased capacity and orders are already in hand for the installation of a further large-capacity kiln together with mills and ancillary equipment. The cost is likely to be about £1,250,000 which will be financed from Ketton's own resources.

GLOUCESTER RAILWAY CARRIAGE & WAGON COMPANY, LIMITED—Following a reduction in the interim payment from 6d. to 4d. per 10s. share, the company is reducing the final by 4d. to 8d. per share for the year ended May 31, 1960.

HENRY BALFOUR & COMPANY, LIMITED—It is intended to raise £250,000 in cash shortly by means of a rights issue. Application has been made to the council of the London Stock Exchange for a quotation for the issued ordinary capital of the company.

INTERNATIONAL TWIST DRILL COMPANY, LIMITED, Sheffield (controlled by the Tap & Die Corporation, Limited)—Group net profit for five months to May 31, 1960, was £336,610 (£142,222) after tax of £39,400 (£21,196). The dividend is nil (15 per cent.)

UNIVERSAL ASBESTOS MANUFACTURING COMPANY, LIMITED—Only £173 of the original £260,000 6½ per cent. convertible loan stock is now outstanding. Of the £20,350 outstanding on August 31, holders of £20,177 have now converted into 72,637 5s. ordinary shares.

COMBINED ELECTRICAL MANUFACTURERS, LIMITED—Acceptance has been received in respect of over 90 per cent. of Switchgear & Cowans, Limited, shares and it is now intended to exercise the statutory right to acquire in due course the remaining shares in Hackbridge & Hewittic, Limited, and in Switchgear & Cowans, Limited.

DORMAN SMITH HOLDINGS, LIMITED, electrical engineers, etc., of Salford (Lancs)—Group profits before tax rose from £100,531 to £184,718 for the year ended March 31, 1960, and the dividend is increased from 17½ per cent. to 33¼ per cent. After tax of £89,536 (£50,005), the net profit is £95,182 compared with £50,526 previously.

PICKFORD HOLLAND & COMPANY, LIMITED, makers of basic bricks, fire resisting products, etc., of Sheffield—Trading profit recovered from £221,306 to £350,864 for the year to July 3, 1960. A final dividend of 15 per cent. makes a 20 (17½) per cent. total. Net profits are nearly doubled at £111,636 (£61,597) after tax of £94,650 (£46,250).

SOLAR INDUSTRIES, LIMITED, Glasgow (formerly Aluminium Castings, Limited)—Final dividend of 12½ per cent. exceeds the forecast by 2½ per cent. and makes 17½ per cent. for the year ended March 31, 1960, on £800,000 capital. This is against a previous total of 15 per cent. on £400,000 prior to a one-for-

two scrip issue and a cash placing, or a 10 per cent. equivalent taking the scrip issue into consideration. Net group profit was £214,674 (£121,169) after tax of £237,116 (£166,000).

ANGLO-SWISS SCREW COMPANY, LIMITED, West Drayton (Middx)—A four-for-five scrip issue is proposed. The directors state that results for the year are expected to be "exceptional," reflecting full utilization of the company's capacity. They intend to pay as soon as possible an interim dividend of 3d. a share on the increased capital and a final dividend next March of 7d. a share.

MARTIN BROS. (MACHINERY), LIMITED, machine tool manufacturers, of Manchester—Net loss of £2,170 was incurred in the year ended June 30, 1960, compared with a previous profit of £918 after tax of £574 (£860). The dividend is reduced from 14.7/12 per cent. to 8¼ per cent., but this time holders are to receive 4d. per 2s. share, not subject to tax, out of surplus arising on realization of fixed assets.

TINSLEY ROLLING MILLS COMPANY, LIMITED, SHEFFIELD—The director hesitate to forecast another record year but the order-book is full, the mills are fully employed, supplies of steel are reasonably satisfactory and the medium term outlook is encouraging. Profit for the year, after tax, is £55,816 and the balance £26,200. The final of 12½ per cent. makes a total for the year of 17½ (15) per cent.

CALOR GAS HOLDING COMPANY, LIMITED—About £1,000,000 of further permanent capital to finance the building of three new filling stations, and for additional cylinders and equipment to meet expansion in the industrial field, is to be raised. Following the annual meeting on October 14 there will be an extra-ordinary meeting to consider increasing the authorized capital from £2,500.000 to £4,000.000 by the creation of a further 6,000,000 shares of 5s.

WELLINGTON TUBE HOLDINGS, LIMITED—Group net profit expanded from £501,073 to £696,408 in the year to June 30, 1960, and the dividend is raised from the approximate equivalent of 14.3 per cent. to 17½ per cent. with a final of 12½ per cent. Trading profits and other income increased from £1,028,965 to £1,414,082, subject to tax of £717,674 (£527,892). As known, the company has made an offer for the capital of Gibbons (Dudley), Limited.

GANDY, LIMITED, belt manufacturers, etc., of Wallasey (Ches)—A dividend of 8 per cent. is announced in respect of the 19 months, ended July 31, 1960. No payment was made for the year 1958, but holders received a special interim dividend of 4 per cent., less tax, declared for the following period, plus a special distribution of 2½ per cent., not subject to tax. Group net profits for the 19 months totalled £30,365, against £4,461 for 1958, after tax of £6,294 (£1,850).

WILLIAMS & WILLIAMS, LIMITED, metal window and door makers, of Chester—Group net loss of £686,706 is reported for the year ended April 30, 1960, compared with a previous profit of £20,118, and no dividend is recommended on the ordinary shares against 5 per cent. previously. Payment of the half-year's dividend due on the 8 per cent. cumulative preference on April 30 last was postponed. Of the loss, £679,731 (profit £19,146) is stated to be attributable to the parent company.

BROWN BAYLEY, LIMITED—The parent and its two operating companies, Brown Bayley Steels, Limited, and the Hoffmann Manufacturing Company, Limited, are raising the interim dividends for 1960. Brown Bayley's interim is raised to 5 (2½) per cent. Brown Bayley Steels to 5 (3) per cent., and Hoffman, on the capital doubled by a scrip issue, to 7½ (3¾ equivalent) per cent. It is aimed to bring the interim and final dividends more into proportion and it cannot be assumed that the total will be increased.

JOHN WALLACE & SONS, LIMITED, agricultural machinery makers, printers, etc., of Glasgow—Purchase is to be made of 87½ per cent. of the capital of Arthur Productions (Clydebank), Limited, makers of kitchen furniture and fittings, of Glasgow, to be settled on November 30. Acquisition of further businesses, it is hoped, will also be effected on that date. For the year ending March 31, 1961, the board forecasts a total dividend of 18 (10) per cent., of which an interim of 6 per cent. is expected to be paid in January.

ASSOCIATED ELECTRICAL INDUSTRIES, LIMITED—Group net trading profit for the half year to June 30, 1960, dropped slightly to £4,940,000, before tax, compared with the corresponding period last year and with £6,090,000 for the second half of last year. Orders received, mainly for delivery within three years, amounted to £113,000,000, against £84.900,000 and £97,100,000. A second interim dividend of 6d. per £1 unit is declared making 1s. per unit to date, as before. A total of 3s. per unit was paid for the previous period.

ASSOCIATED ENGINEERING HOLDINGS, LIMITED—An offer has been made to acquire all of the share capital of Silverton Engineering & Motor Works, Limited, a South African company manufacturing radiators for motor vehicles and aluminium alloy castings, which has been accepted by the holders of over 99 per cent. of the capital. Total purchase consideration will amount to £254,757 in cash. Profits of Silverton Engineering to the year to June 30, 1960, amounted to £31,262, after all charges but before tax.

HEENAN, BEDDOW & STURMEY, LIMITED, constructional and general engineers, of Manchester, 10—The group made a net loss of £12,903 (profit £4,384), after taking credit for £3,020 income tax recoverable, for the year ended November 30, 1959. The directors do not recommend payment of any dividend (same). Trading conditions during the year were most difficult and the volume of orders obtained fell substantially, states Mr. Harry Lane, chairman. In the current year, sales are still at a low level with no immediate prospect of substantial improvement, although every effort is being made to secure additional work.

ROMAC INDUSTRIES, LIMITED, motor accessories manufacturers, etc., of London, N.W.9—The company is paying a final dividend of 22½ per cent., making 27½ per cent. for the year to March 31, 1960, against a single payment of 17½ per cent. The net profit increased to a record £27.432 from £21,273, after tax of £26,874 (£23,395), etc. Export trade expanded during the year and the trend of the order-books gives support to quiet optimism in export markets, the chairman states. The cable division maintains satisfactory progress and there is every indication that it will continue to improve, he adds.

JAMES AUSTIN & SONS (HOLDINGS), LIMITED, parent company of iron and steel stockholders and engineering group, of London, W.1—In connection with the acquisition of all the capital of Hartley Electromotives, Limited, from Hartley Baird, Limited, which is controlled by Camp Bird, Limited, it is stated that the first instalment of £139,000 was paid last month in cash from the group's own resources. Group profits, before tax, of Hartley in the year ended April 30 last amounted to £22,330 (£30,675). Those for the 14 months to June 30, 1961, are estimated at the rate of not less than £30,000 per annum. All profits since last April will accrue to Austin. Net assets of Hartley at end-April totalled £305,419.

Power loading has brought a high degree of efficiency to the actual mining of coal and attention is now being turned to the slow, laborious, and costly work involved in controlling convergence by hand packing. In this paper, read at a meeting of the Lancashire Branch of the National Association of Colliery Managers on February 24, 1960, the application of total caving to both power-loaded and conventional faces at Clock Face Colliery, in the NCB's North-Western Division, is described.

Total Caving in Lancashire

EXPERIENCES AT CLOCK FACE COLLIERY

By J. ABBOTT*

MINING engineers have been confronted with the problem of controlling the movement of strata since the time of the discovery of coal. Throughout mining history numerous methods of working and systems of support have been applied to win deposits of coal cheaply and with safety. This paper gives experiences with total caving at Clock Face Colliery in the No. 3 (St. Helens) Area of the North-Western Divisional Coal Board. The colliery is situated three miles to the south-east of St. Helens in south-west Lancashire.

A pithead output of 6,000 tons of coal per week is produced from the Yard Seam in the Middle Coal Measures. Details of the seam are as follow:—Depth of working, 2,120 to 2,270 ft.; seam gradient, 1 in 3 to 1 in 7; average seam section, 54 in.; nature of roof, 12 ft. of blue shale, followed by 15 ft. of dark grey rock; nature of floor, 3 ft. medium hard fireclay followed by 27 ft. of shale.

In conjunction with a reorganization scheme it was decided to exploit a virgin area of coal to the south of the Waterloo fault, which runs from east to west with an upthrow of 300 ft. This area is known as the Waterloo area. Access to the Waterloo area is gained along intake and return roadways 2,530 yd. in length. These roadways pass through the Clock Face area, which is exhausted of workable reserves at this horizon. From past experience it was known that the access roadways to the Waterloo area were subject to crush and maintenance costs would be high. It was also known, from experience at an adjacent colliery working the Waterloo area, that faulted and gassy conditions would prevail.

Transport and Face Efficiency

To offset the heavy costs of roadway maintenance, faulted conditions, and methane drainage, it was essential to obtain a high degree of efficiency in transport and face operations.

High transport efficiency has been obtained by the concentration of faces to convey the coal to a common loading station in the Waterloo area, from where trains of coal are hauled to the shaft by locomotive. High face efficiency has been achieved by mechanization and total caving.

It is interesting to note that, speaking generally, power loading has contributed to the wider application of caving, in that, having introduced power loading, a high degree of efficiency has been obtained on the face side of the conveyor and has now attracted attention to the slow, laborious, and costly work involved in controlling convergence by packing.

As far as Clock Face Colliery was concerned, a daily advance of 4 ft. using precutting and shearer loaders was contemplated. To strip pack in the conventional manner for this advance would detract from the efficiency. Total caving was therefore considered the most economical method of roof control.

Factors to be Considered

The following factors had to be considered before the decision to cave the Yard Seam was taken:—

(1) Was the strata above the seam suitable? (2) Was the strata below the seam suitable? (3) Would the surface and seams above be adversely affected? (4) Which system of support should be used? (5) What degree of crush would be experienced in roadways? (6) Which was the best type of power loading to be used in conjunction with caving? (7) What affect would caving have on gas emission? (8) How would faults be negotiated? (9) Would it be better to cave to the strike, full dip, or full rise of the seam? (10) Would the accident risk increase? (11) Would the spontaneous heating risk be increased? (12) Would ventilation leakage occur? (13) Was there any risk of fracture in the roof to water-bearing strata? (14) Would junior officials and workmen give their support to the new venture?

This summary of factors involved was discussed in detail with HM Inspectors, mining engineers, officials, and workmen, and a decision was carefully taken to conduct experiments on one unit.

The experimental unit chosen was the North Yard face in the northern area where the reserves

* Manager, Clock Face Colliery, No. 3 (St. Helens) Area, North-Western Divisional Coal Board.

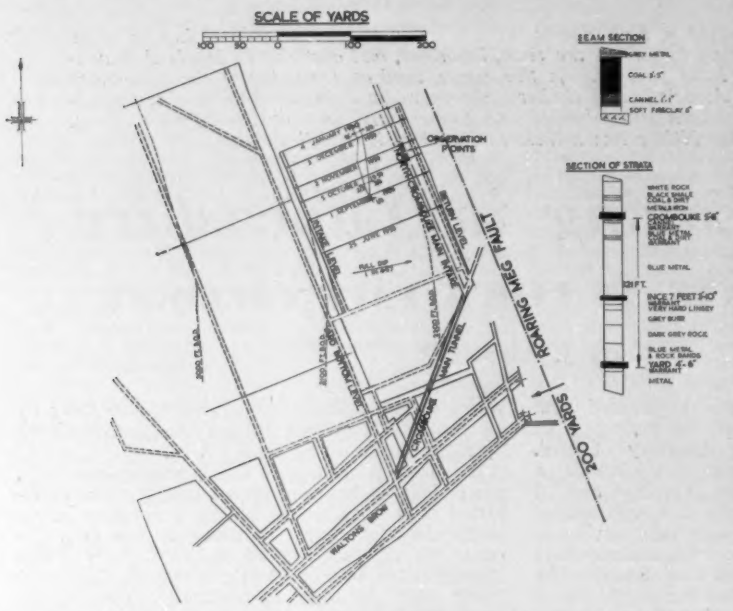

FIG. 1.—LAYOUT OF THE EXPERIMENTAL UNIT IN THE NORTH YARD SEAM.

above had been exhausted. The layout is shown in Fig. 1.

This face, 185 yd. long advancing to the strike, is equipped with a panzer conveyor delivering against the gradient, on which are mounted a precutter, cutting to a depth of 4 ft. at 15 in. from the roof, and an Anderton shearer loader, taking a 2-ft. web with a 40-in. dia. drum. The coal tops are fired and normal stables are maintained at each end of the face by pulsed-infusion shotfiring. It should be noted that the precutting, used primarily to give a larger sized product, also contributes to the caving by relief of stresses in the roof at 4-ft. intervals.

Support is given to the roof by 3½-in. by 3½-in. Twin Trof bars, 10 ft. long, in the stables, roadheads, and roadside pack areas. Twin Trof bars, 9 ft. long, are used throughout the remainder of the face. The bars are supported by hydraulic props and slide bar heads. A double-bar system (Fig. 2) is used to give a maximum distance of 14 ft. from face to waste edge. In the initial stages the maximum distance from face to waste edge was 18 ft., but this was reduced to 14 ft. because it was felt that too much roof was being carried by the face supports.

The front bars are supported by three props, 19 in. apart, allowing 3 ft. of bar to give cantilever support over the conveyor to the face; these front bars are moved forward as each web is taken. The back bars, supported by two props 4 ft. apart, along with a hydraulic breaking off prop, set between each bar at the waste edge, are moved forward for each 4 ft. of advance. It was decided to move the face away slowly on packs, and progressively leave off the packs until the full length of the face was caved.

Support Tests

Apart from a small amount of prop penetration into the floor during the first few yards of advance,

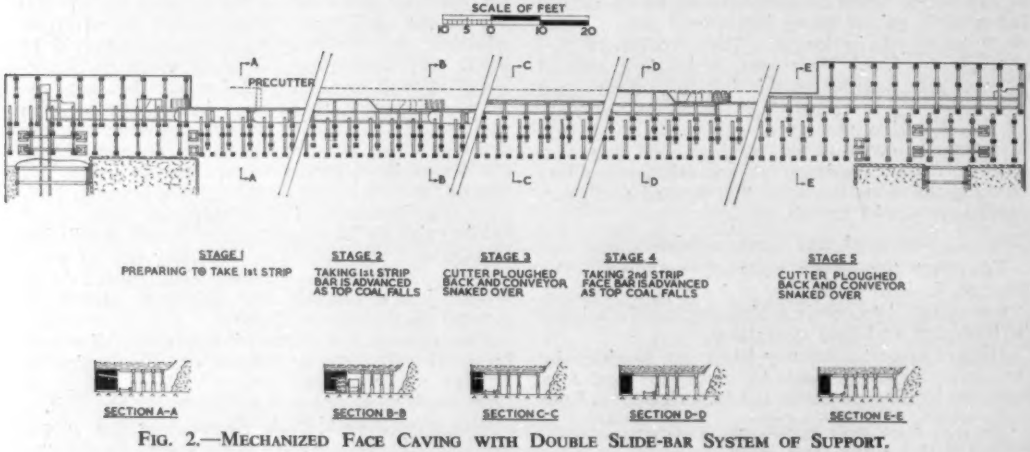

FIG. 2.—MECHANIZED FACE CAVING WITH DOUBLE SLIDE-BAR SYSTEM OF SUPPORT.

excellent results have been obtained with the waste collapsing every 4 ft. to a height of more than 20 ft.

This face has advanced 300 yd. on the caved system and during the last 100 yd. a 9-ft. and 4-ft. fault have been present. The faulted area is being successfully caved. An output of 1,800 tons saleable per week is produced with a daily team of 29 men plus 10 other face-workers, giving a face o.m.s. of 9.13 tons.

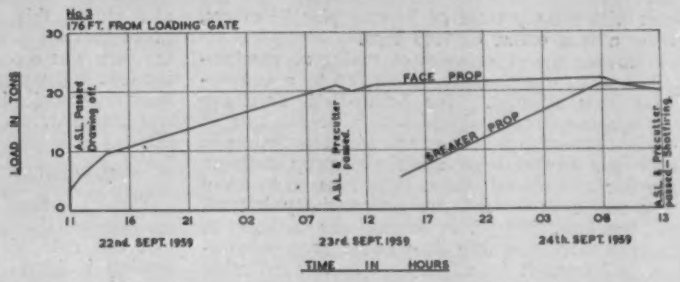

FIG. 3.—NORTH YARD DISTRICT HYDRAULIC PROP LOADING WITH CAVING.

Convergence averaged 3 in., 8 ft. from the face and 6 in. at 14 ft. from the face, giving convergence gradients of 1 in 32 and 1 in 28, respectively. Dynamometer prop tests indicated that the props were accepting their load immediately with no floor penetration.

Individual load cells also indicated that props were accepting their full load along with the waste edge breaker props, to offer a strong resistance to break the roof at the edge of the waste. Fig. 3 indicates the typical loading of the props from being set at the face to their removal at the waste edge. The behaviour of the breaker prop is also shown. The value of the extra resistance afforded by the breaker prop is emphasized by the graph.

Extension of Caving

Following the success of the experimental unit it was decided to extend caving to the Waterloo Yard area. To overcome the initial floor penetration, thoughts were turned to increasing the prop density by decreasing the width from the face to the waste edge using a single-bar system (Fig. 4) where 9-ft. by 3½-in. by 3½-in. Twin Trof bars are set at 3-ft. intervals with four props to each bar with a breaking off prop at the waste edge between each bar. The stables and roadside packing area being supported by 10-ft. by 3½-in. by 3½-in. Twin Trof bars on the double-bar system.

Also with the object of eliminating the initial prop penetration, it was decided to move the face away quickly without packs, it being thought that this would induce the waste to fall quickly and little weight would be borne by the face supports. As the face moved away, however, floor penetration to a depth of 12 in. was experienced in the first 7 yd. of advance, thereafter when the full length of the waste roof had collapsed there was no serious floor penetration.

This face has since advanced 200 yd., caving excellently, and with mechanization as in the North Yard district has produced 1,850 tons saleable per

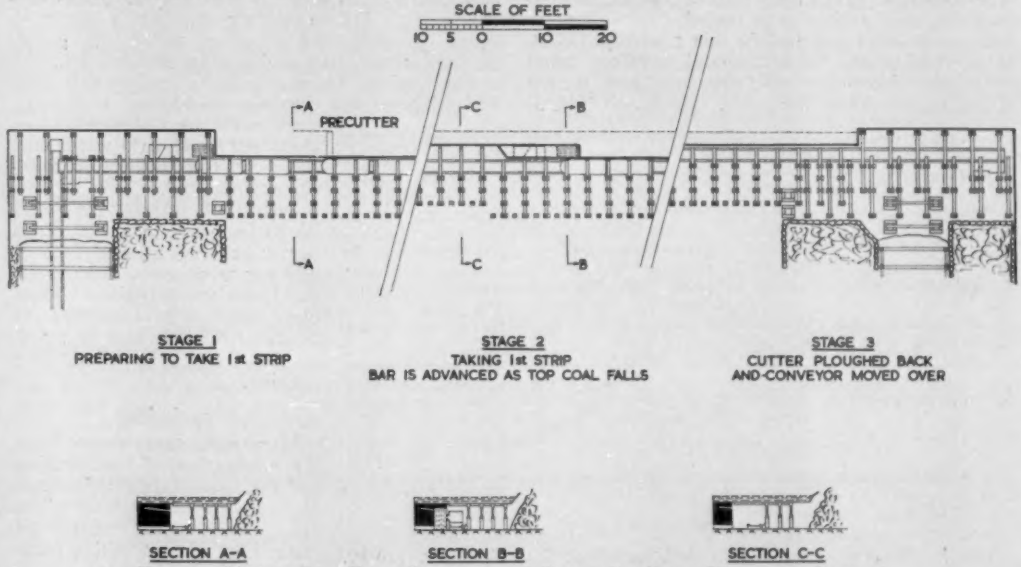

FIG. 4.—MECHANIZED FACE CAVING WITH SINGLE SLIDE-BAR SYSTEM OF SUPPORT.

week with a daily team of 29 men plus 10 others, giving a face o.m.s. of 9.48 tons.

Following the experiences of caving on mechanized faces it was confidently applied to a conventional longwall unit. The South-East Yard dip face was therefore equipped with a double row of 7-ft. W-bars set at 4-ft. intervals with two hydraulic props per bar and an additional prop between each bar at the waste edge. The face was moved away on packs which were progressively left off until the face, 140 yd. in length, was caving. In this case there was very little initial prop penetration. All faces at the colliery are now caved using one of the three preceding systems.

General Effects on Roadways

It was expected that roadway crush in the gate roads would be identical to where packing was employed, but in practice extremely little crush takes place. Fig. 1 shows where the North Yard district left-hand rib side runs 15 yd. away from, and parallel to, an existing conveyor roadway to the Higher Florida Seam. This roadway has suffered no distortion apart from a small amount of floor lift.

In the vicinity of the North Yard district the Crombouke Seam, 120 ft. above, has been worked out and a roadway therein exists near the middle of the North Yard face. Opportunity was taken to install a number of floor plugs in this roadway in advance of the North Yard face, and levellings were taken at regular intervals until the Yard Mine had been worked beyond the plugs. Fig. 5 indicates the behaviour of the strata in the roadway above the caved area.

Convergence recorders sited in the same roadway above the caved area recorded 14 in. of convergence over a six-month period. A number of floor plugs were installed in this roadway 125 ft. in advance of the Yard face and levellings taken at regular intervals until the face had moved 250 ft. in advance of the plugs. The graph (Fig. 5) also shows this floor movement and it will be noted that the floor lifted 4.2 in. to the time when the face was directly beneath the plugs and when the face had advanced 250 ft. beyond the plugs the floor lowered 1.4 in. below the original level. There was little distortion in the roadway apart from floor lift.

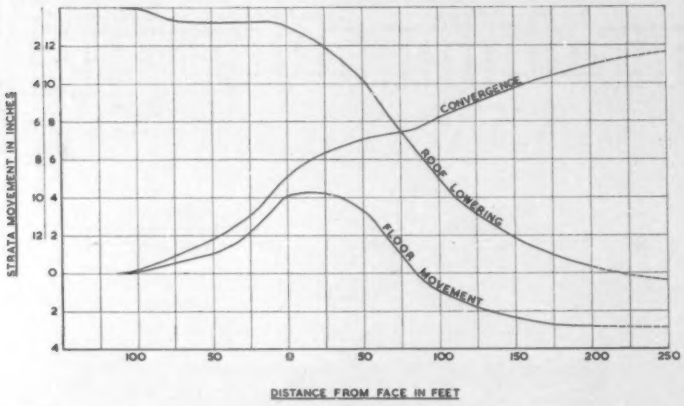

FIG 5 —MOVEMENT OF STRATA IN CROMBOUKE SEAM ROADWAY 120 FT. ABOVE NORTH YARD FACE.

Ventilation and General Observations

There has been no evidence of ventilation leakages across the caved wastes nor any indication that the risk of the occurrence of spontaneous heating is increased. Air samples taken in the general body along the caved faces show CH_4 contents of less than 0.4 per cent. Air samples taken at the return end of the face immediately after waste collapse indicate a reduction of up to 0.3 per cent. CH_4 for intervals of 10 to 20 min., after which the amount of CH_4 in the general body assumes its normal level.

In the virgin Waterloo Area where the gas emission is 1,600 cu. ft. per ton, methane drainage is carried out. Samples taken 6 ft. inside the caved area show CH_4 contents of less than 1 per cent. The amount of CH_4 in the general body of the district return airways is no greater than in districts where packing is used.

Caving can be applied in any direction in relation to full dip or direction of cleat. The accident rate on caved faces is reduced.

Although the reception to caving by workmen was at first an attitude of doubt, they showed a willingness to try and they would now be most reluctant to return to the packing operation. There has not yet been the opportunity to collate information to indicate the effect of caving on surface subsidence or its effect in proximity to water-bearing strata. Where surface damage is likely to occur or where the influx of water may occur, methods other than caving may be advisable.

The savings to be made by caving will vary according to the systems used prior to caving. At Clock Face Colliery 89 face shifts per week, or a wages cost of 1s. 5d./ton, is saved on packing not required.

Losses of supports have reduced from five hydraulic props per week on a packed face to one per week on a caved face. Bar losses are negligible. When bag packing is employed as much as 3d./ton can be saved on bags alone by eliminating packing.

Conclusions

Many advantages accrue from the application of total caving and the Lancashire coalfield can ill afford to retain some of its old prejudices to changes in these times of competition from other sources of power.

To determine if a seam will cave the advice of the strata control engineer is recommended, followed by experiments on short lengths of face and gradually expanding.

Leaving out packs on existing support systems is not enough. Good caving will give the effect of higher pack density to support the higher bands of strata. A high prop density using a preloading type prop supporting as little roof area as possible with a strong breaking-off line is the key to success. Precutting to a depth to coincide with or multiples of the withdrawing distance will aid break off at the waste edge.

The author's experiences are limited to five caved faces in one seam, but other collieries in the St. Helens Area are experimenting in seams of varying natures. The application of caving can be extended—indeed, must be extended—if we are to progress towards installations such as self-advancing chocks and manless faces.

Thanks are due to Mr. T. Hulme, Area general manager, for permission to publish this paper and to HM Inspectors and National Coal Board engineers for their assistance during the introduction of caving at the colliery. The divisional strata control engineer and the No. 3 (St. Helens) Area No. 2 Group staff are also to be thanked for their assistance in the production of this paper. Any opinions expressed are those of the author and not necessarily those of the National Coal Board.

DISCUSSION

MR. P. WHINCUP, who had read the paper in the author's absence, answered questions afterwards.

MR. L. R. BOYFIELD said two systems of support had been described, the single bar and the double bar, and he asked if any conclusions had been reached as to which was preferable. MR. WHINCUP replied that it was not yet clear which was preferable. He added that the double-bar system involved less "elements of work," but pointed out that the points in favour of each were somewhat finely balanced. He was in favour of the single bar. Opinions were divided at the colliery, and more experience was needed before an opinion could be expressed.

MR. G. W. SANDERS said a very short, but very important, statement was made in the paper, that the accident rate on a caved face was reduced, and asked for the reasons why this occurred. MR. WHINCUP confirmed that this was a fact. Compared with the available information on faces before the introduction of caving, the reduction was at least 50 per cent. He thought the main reason was that all the men worked under supported ground. Very little latitude was given to workmen to set supports where they were not going to do much good and the system had to be worked as planned.

MR. J. C. FLETCHER questioned the inference that men had no occasion to go under unsupported ground. When the prop density and length of props were considered he thought there must be occasions when people working on the face had to go out behind the props.

MR. WHINCUP said he was horrified by the thought that men would have to walk in the waste. Unless the props were straight there was the risk of trouble, but the men quickly learned that they had to have the props straight. He affirmed that there was no occasion to pass outside the waste edge props, and he had yet to see it happen. In fact, the waste was usually down before the props were drawn.

MR. DOWNING said the paper was the first he had heard or read on the subject of caving where chocks had not been used. He asked whether chocking was considered in the St. Helens caving experiment, and what brought about the choice of hydraulic supports.

MR. WHINCUP said chocks were certainly considered, but the face was moving at 4 ft. per shift on the double-shift system and the view was taken that a chock was only tight when weight came upon it. The hydraulic support had one tremendous advantage—it gave a pre-setting load near to 5 tons. This system made use of that fact. It was preferable to close chocking because on double-shift working chocks were due to come out again before they were really tight.

MR. G. W. SANDERS added that it had been found that it was very difficult under pit conditions to set a chock which would give a resistance on setting of 2 tons. Most chocks did not offer a resistance of more than 1 ton, and it was confirmed by laboratory tests that a chock must be reduced by as much as 4 in. before it could bear a load of 5 tons. "We are completely deceived in many instances as to the value of wooden chocks. They are only of value when the roof is on the move in a dangerous manner," he added. At 20 tons, the convergence of a chock would be as much as 8 in. and strata control was completely inadequate.

MR. WHINCUP explained that the author had been careful in his paper to point out that these were experiences gained in one colliery. He would not say this was a system of caving which could be applied indiscriminately anywhere, but provided waste edge support could be provided, most seams could be caved.

MR. R. H. CLOUGH, HM Divisional Inspector of Mines, who seconded a vote of thanks to the author and speaker, said everyone knew that caving in principle had been under something of a cloud in past years, chiefly because the impression was created that when caving, there was a higher gas emission. He felt this might still be true in some seams and under some conditions. The author made the case that firedamp emission was not, in fact, increased, and he felt at least there was very little leakage across the cave waste. Unless firm observations were made to support that, Mr. Clough thought there would be considerable leakage.

Mr. Clough said the systems that had been described gave a maximum distance of unsupported roof of 5 ft. 6 in. to 6 ft. But some systems now had the additional features that this distance was being increased to almost 7 ft., and at the same time, the width of faceworking was being reduced to about 11 ft., with a concentrated line of power chocks as support. We should exercise a little caution, suggested Mr. Clough.

Referring to the statement that the accident rate was reduced with caving, Mr. Clough said that typical waste accidents which had occurred in the last five years over the whole country, had been examined, and there was not a single instance of a fatality occurring at the waste edge of a caved face.

APPLICATIONS OF heat-resisting alloys manufactured by Henry Wiggin & Company, Limited, London, S.W.1, will be demonstrated at exhibitions in Sheffield (Grand Hotel, until September 27) and Glasgow (More's Hotel, September 27-29).

Use of Foam to Control Mine Fires

BUREAU of Mines research in using high-expansion foam to control underground mine fires is the subject of a progress report released by the US Department of the Interior. The technique, developed originally in England, involves the use of chemicals—often the familiar home-laundry type of detergent—to create the foam, which is pushed toward the site of the fire by the mine's ventilating current. The bureau's studies at its experimental coal mine near Pittsburgh, Pa., have covered various kinds of foam-making chemicals and foam-making equipment as well as different types of fires.

The report tells of foam attacks on 16 fires set in the mine—14 with coal, one with wood, and one with oil as the fuel. Thirteeen of the fires were brought under control, including those involving wood and oil.

The three coal fires that were not controlled were subjected to foam that was purposely low in water content.

According to the bureau, foam must contain at least two-tenths of an ounce of water per cubic foot of foam to be effective. Some of the fires were extinguished outright, but the studies revealed that in many instances the foam's chief effect was a cooling influence that permitted experimenters to enter the fire zone and make a direct and final attack with water or other extinguishing agent or load the hot material into cars for removal from the mine.

In addition to its cooling properties, foam has a blanketing effect which reduces oxygen and prevents air circulation.

As a result of its experiments to date, the bureau continues to recommend that rock dust (powdered limestone), or other "approved and readily available extinguishing agents" can be tried first on mine fires because they can be used more readily. Foam-making equipment, which requires time to set up, may prove more advantageous where heat, roof falls, and smoke prevent direct approach with conventional fire-fighting methods and equipment, the bureau adds. "The effectiveness of foam in controlling a deep-seated fire of considerable extent has yet to be proved by actual trials in a mine."

The research report also covers tests to determine the progress of foam through single and multiple entries of a mine and a few trials on the quenching action of foam in gas and coal-dust explosions. One of the tests in moving foam through multiple entries was in a regularly operating coal mine, but no fire or explosion was involved.

The publication, Report of Investigations 5632, "Controlling Mine Fires with High-expansion Foam," can be obtained from the Publications-Distribution Section, Bureau of Mines, 4800, Forbes Avenue, Pittsburgh 13, Pa.

New Tractor Hitch

RECENTLY announced by Massey-Ferguson (Great Britain), Limited, Manchester, is a new device for the 65 tractor, called the "Multi-pull Hitch." It is designed to provide a transfer of weight from a trailed implement or four-wheeled trailer to the tractor's rear wheels; it may be used with either an automatic trailer hook or with a swinging drawbar.

This new development makes use of one of the features of the Ferguson system, the double-acting top link. Normally, with a mounted implement such as a plough, the top link on a Massey-Ferguson tractor works in compression to operate the hydraulic mechanism automatically. With the "Multipull Hitch" the top link works in tension so that as the tractor pitches over uneven ground, the varying tension loads automatically readjust the position of the tractor's lower links which, in turn, maintain a steady lifting force on the drawbar. As a result, a constant transfer of weight from the implement to the rear wheels of the tractor is maintained.

This new hitch was originally developed and patented for use with implements such as a gang roller or heavy harrow by Massey-Ferguson's Swedish distributors, Aktiebolaget Farming. An initial supply has been imported from Sweden, but British-made hitches will progressively become available from the Massey-Ferguson factory in Kilmarnock.

It is recommended that a front-mounted weight frame and up to eight 60-lb. weights should be fitted to the tractor when using the "Multipull Hitch." The weights are easily removable when not required and the weight tray acts as a useful bumper bar to protect the tractor radiator. Use of this attachment will result in a further weight transfer of up to 1,000 lb. to the rear wheels of the tractor.

New Shaft-sinking Methods in Idaho

SHAFT-SINKING methods and costs in the Coeur d'Alene metal mining district of northern Idaho are described in US Bureau of Mines Information Circular 7961.

Summarizing practices in drilling, blasting, mucking, and hoisting, the bureau's report also contains a detailed breakdown of performances and costs at 13 shaft-sinking projects in 10 different mines. The shafts range in depth from 160 ft. to over 2,000 ft. and have two to four compartments. Some are vertical, some inclined.

According to the bureau, a major change in Coeur d'Alene methods is the replacement of hand shovelling by mechanical mucking. Recent innovations, including the use of rock-bolted bearing sets, pre-packaged timber, and steel blasting sets, have improved safety and efficiency. Most equipment, however, such as hoists, drills, and ventilation and pumping machinery, remains essentially the same in principle.

Information Circular 7961 can be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, DC, USA, price 25 cents.

BISRA JUNIOR STEELMAKING CONFERENCE

Human Factors in the Steel Industry

By A. BOX

(*British Iron and Steel Research Association*)

This week we are publishing the paper presented at the third and final session of the 14th Junior Steelmaking Conference, held at Scarborough on June 22 and 23. This paper reviews the work of the Human Factors Section of the British Iron and Steel Research Association and shows how the application of the knowledge gained could lead to safer and more efficient working and utilization of steelworks' plant.

THE steel industry is highly dependent upon human beings for the production of iron and steel and undoubtedly will continue to be so in the future, though perhaps in a rather different way. At the same time, it is equally apparent that a great deal of technical change is taking place both in productive techniques and organization and also in the design and evolution of specific items of plant and equipment. So far as shop floor operation is concerned, the general tendency of this technical innovation is for process control to become more remote and to be exercized from central control points or stations and through the intermediary of progressively more complex instrumentation and control equipment. Perhaps the design of power station control rooms and the design of motor rooms represents the furthest point reached along this line of development in a steelworks.

Economically one of the more important aspects of the present-day technical development in the steel industry is that it places a higher premium upon continuous working and the avoidance of breakdowns and delays: the high cost of capital equipment, the tempo of production, the market value of finished steel products, and the inter-dependence of the various departments of a modern steelworks all conspire to make any reduction in the quantity or the quality of output increasingly costly and far-reaching in its consequences.

Mental Skills

It is evident that the human operator in the steel industry will not be unaffected by these changes in his working environment. One of the main aspects in this regard is, without doubt, the decreasing importance of sheer manual effort and the correspondingly increasing importance of mental skills such as imagination and judgment and the human ability to learn by experience and make immediate decisions—all skills which are, in fact, uniquely human or in which the machine is inferior. In so far as the smooth and efficient working of plant depends upon the individual operator and in so far as the occurrence of costly delays and breakdowns are the result of human error rather than mechanical failure, the net result of the kind of technical development now taking place is to increase the importance and responsibilities of the human being in the steelworks.

Part of the work of the Human Factors Section at BISRA is concerned with accident research. In this field the primacy of the human factor in accident causation has become increasingly widely recognized since the turn of the century or so. Thus, as far back as 1922 the Chief Inspector of Factories, in a report on dock accidents, wrote: "It will be seen that a very large proportion of the accidents originate from causes not concerned with deficiencies in safeguards or defects in plant and machinery, and the main hope of reducing the number and severity of accidents would seem to be rather in the elimination of hazardous practices than in improvement in standards of safeguarding".

Injury Statistics

The Chief Inspector of Factories is here referring, as is his proper concern, to accidents which result in personal injury: in fact, most of the so-called accident statistics which are collected by works are, strictly speaking, injury statistics. Some investigators, however—notably those interested in motor vehicle accidents—have distinguished a second category of accidents, *i.e.*, those which result in damage to plant and products rather than in personal injury. It is legitimate to inquire whether the human factor is as important in these "production" accidents (as they might be called) as it is recognized to be in injury-causing accidents.

It is tempting to ascribe the occurrence of accidents either to a merely unfortunate set of circumstances or to an ineradicable element of "carelessness" or "inattentiveness" in human nature: indeed, the term accident means an unforeseen event or one happening purely by chance and two early investigators in this field—Greenwood and Woods—characterized accident research as being concerned to distinguish those events which are accidents in the strictest sense from those which are not. In fact, the success achieved over recent years in reducing the accident rates in the steel industry

generally to the present relatively low levels indicates that the bulk of injury-causing accidents at least can be foreseen and the appropriate preventive measures taken. Accident research then is concerned with disentangling the various elements associated with accidents—age, experience, basic skill, attitudes towards safety clothing, and so on—in order that accident prevention efforts may be directed most effectively.

If the same situation were found to apply to what are here called "production" accidents—events in which breakdowns and delays are the result of human errors—clearly a substantial step would be made possible towards the smooth and efficient working of plant and the control of steelmaking processes.

The Human Factors Section at BISRA is concerned with questions implicit in the above discussion on accidents: the human factor in the steel industry may perhaps be defined as that which is left when purely mechanical and technical factors are subtracted from the whole. The questions raised are manifold. How important are human factors in efficient working and utilization of plant? What are the elements, both social and environmental, which are most influential in individual safety and efficiency? To what extent do human limitations and capabilities figure as limiting factors in continued progress? When may human beings best be replaced by machines and in what respects are human beings superior? Lastly, given knowledge of these various points, how may this best be utilized to contribute towards the overall efficiency of the industry?

"Safe Working is Efficient Working"

Historically the H.F.S. was formed in 1959 from the amalgamation of two previously existing sections. The first section, which was originally part of the Plant Engineering Division, was concerned with so-called ergonomic research, and the second section, which was in the Operational Research Department, of which the new section is now also a part, was mainly concerned with the accident research already mentioned. One effect of bringing together these two apparently separate lines of inquiry was to underline the point discussed above, namely, that a study of industrial accidents and a study of individual efficiency are really related aspects of a single study of human behaviour within the social and technical environment of a works; in fact, one could perhaps coin the slogan "safe working is efficient working."

In the remainder of this paper it is intended to concentrate mainly on the ergonomic aspect because this is likely to be of greater interest to an engineering audience. The work on accidents will be mentioned in passing. Two studies have recently been completed, the first concerned with assessing the various factors making for the wearing of safety footwear by steelworkers and the second with measuring the effectiveness of safety posters in influencing unsafe behaviour.

One of the main results of the first study was to show the importance of safety boots and shoes being made available on hire purchase as a means of encouraging their greater use: so far as the workers themselves were concerned, it was shown that they were far more interested in comfort and wearing qualities and almost totally disinterested in safety aspects. In the second study it was shown, perhaps surprisingly, that the posters used were effective and remained effective for some length of time: there is, however, good reason to suppose that this result may not apply to any posters in any situation—the question of the type of poster to use and the kind of situations in which it is likely to be effective needs further careful consideration.

New Departure in Accident Research

A project at present in progress is an extension of an earlier study carried out at BISRA in which the "works' life histories"—accidents, absences, promotions, etc.—of a year's intake of personnel into a steelworks were followed over their first four years of service. The line of approach to this study was something of a new departure in accident research in that previous thinking had tended to view accidents as isolated incidents, the occurrence of which pointed the need for more adequate safeguarding of machinery or which were related to individual human characteristics such as accident proneness.

The new approach viewed accidents as events in the working life of an individual within the technical and social context of the works and therefore the interest was in discovering how accidents were related to other aspects of an employee's working life and experience. The method employed of following up the works careers of a new intake group constituted, in fact, a study of the way in which a newcomer adapts himself to his job and learns to fit into the ways of the works and its technical demands—a process of which both the occurrence of accidents and his absence record are related aspects.

The results of this study were suggestive in many ways, but of particular interest was the finding that the number of accidents sustained by the entrant group progressively decreased as their length of service—or their experience—increased, a result which suggests that, in some way or other, the men were learning not to have accidents. Also of interest was the fact that the "accident sustaining" members of the group had a distinctly different pattern of absence from various causes from the members of the group who remained accident-free over the four years: the accident sustainers had a consistently higher level of overall absence other than that arising from accidents.

Work in progress on accidents includes a repetition of this earlier study in two further steelworks in order to check the results. In some ways, however, the methods of the first study are being augmented and elaborated. Lastly, in the field of accident research some attention is being given to the way in which works collect and present their

accident data. A scheme is under preparation by which accident statistics are plotted periodically on specially drawn-up charts, similar to those used by inspectors in statistical quality control. It is hoped that this will enable a closer and more effective check to be kept on accident rates and that it will also suggest the proper time to take action.

Design of Plant and Equipment

Man, the living organism, has for a long while been the object of scientific study. The sciences of physiology, anatomy, and medicine date back to antiquity; and psychology, as the scientific study of human behaviour, though of much later origin, is now well established. Of recent years the idea has grown that the knowledge gained by these studies and, perhaps more important, the methods employed, might be utilized in the study of man at work and in his working environment. In particular, the suggestion has appeared that it is essential that what is known of the limitations and capabilities of the human operator must be taken into account in the design of plant and equipment if the conditions for the most efficient working both of man and machine are to be realized.

Correlative with this suggestion is the assertion that the source of a great deal of inefficient working is traceable to the fact that the plant and equipment which men operate are inadequately designed to enable the full use of their capacities. In recent years, for example, the causes of at least four air crashes, all of which resulted in the complete destruction of the aircraft and loss of life, have been attributed by official inquiry to the pilot misreading his altimeter. This was considered to be the result not of "carelessness" on the pilot's part but to the poor design of the altimeter. As a consequence of these inquiries, the Air Registration Board ordered the design of a new, more easily read, altimeter for British aircraft.

The essential point of this example is that the total load placed upon the human operator—in terms of the number of actions he had to perform in a limited time—was unnecessarily increased by the poor design of his instrument and in this instance exceeded his capabilities. In point of fact, an American study of altimeter dials, reported as long ago as 1948, which well precedes the date of the four crashes, heavily criticized the standard three-pointer altimeter dial as particularly liable to reading errors. Laboratory tests showed that experienced pilots misread the dials by 1,000 ft. or more in some 12 per cent. of readings and required some 7 sec. to interpret the indicated height. For comparison, the respective figures for a suggested improved design, which combined a digital indicator with a single pointer dial were:—0.7 per cent. errors of 1,000 ft. or more and 1.7 sec. reading time.

It is unlikely that any individual operator in a steelworks has a task equal in complexity to that of piloting an aircraft or that the consequence of his errors will be quite as dramatic. Nevertheless, the kind of developments taking place in the industry talked about at the beginning of this paper are making it more important that the human operator is considered from the beginning when new plant and equipment is planned or designed.

The particular viewpoint outlined above, the study of man-machine relationships, has come in this country to be widely known by the name of ergonomics, though it is also referred to by a variety of aliases, notably human engineering, biotechnology, human factors in equipment design, and so on.

Briefly, ergonomics may perhaps be summarized as design for human use and operation or, more pithily, "fitting the job to the worker." Ergonomics is a twofold activity: firstly, as a branch of science, it seeks to amass knowledge of man's basic anatomy, physiology, and psychology relevant to his working life. In particular, it seeks to establish in detail the conditions in which human beings may be expected to work at their maximum efficiency. Secondly, as a practical activity concerned with working efficiency, it seeks to secure the interest of designers and engineers to ensure that this knowledge is implemented in the actual design of plant, equipment, and also the working environment.

In practice, so far ergonomic research and its application has been concentrated upon detailed aspects of the display of information—dials, display panels, etc.—the design and layout of controls, control-display relationship, and upon the physical environment—heat, ventilation, lighting, and noise. A large literature now exists on these topics.

Experimental Methods

The methods used in this research are largely experimental—a representative sample of human operators is tested in a series of different conditions and the effect on performance is noted. The optimal conditions can then be specified.

Ergonomic research at BISRA arose out of a survey of steelworks' cranes made some 10 years ago in connection with a new crane specification. It was realized that existing crane cabs were ill-adapted and badly designed for human operation. Crane drivers were, as often as not, required to stand or at best had provided themselves with a box or an old typist's chair: existing controllers were large and bulky, impeding vision and making impossible a compact layout. Controller handles had awkward semi-circular movements requiring the controllers to be widely spaced to prevent interference.

Finally, little or no attention would have been given to designing the cab for good visibility or to protecting the driver from dust, fume, and heat.

The bulk of the work in ergonomics at BISRA has been concentrated on these various points in the design and operation of overhead cranes. Partly this has been a matter of a series of laboratory experiments on the design of controllers and

partly a matter of works trials on actual cranes in normal use.

Such success as has been achieved in bringing about improvements in the design of steelworks' cranes has, of course, demanded a great deal of co-operation both from steelworks' engineers and from crane manufacturers. In fact, once the ergonomic requirements have been specified the task of fulfilling them becomes mainly a matter of engineering ingenuity. This was certainly the case with the development of the "straight line" master crane controller.

An example of this successful co-operation is provided by a recent instance in which the Human Factors Section was asked to advise on the ergonomics of a projected new rod mill warehouse crane in a South Wales steelworks. One of the aspects considered was visibility. It would seem perhaps commonplace to say that a crane driver should be able to see his work, but there is no doubt that this principle has been neglected in the design of many older crane cabs. In this case a small-scale model of the shop and the projected crane was built and used to determine the best design of the cab which would give the driver the required visibility in that particular situation.

Best Position of Cab

To ascertain the best position of the cab on the crane gantry, a lighted torch bulb was placed in the model to simulate the driver and the model placed in a darkened room. From mapping the shadows cast by the various obstructions, with the "driver" in various positions, it was possible to determine the best position for the cab. Next, to determine the best design of the cab structure so as to interfere as little as possible with the driver's vision, a thread attached to the "driver" was used to measure the "cones of vision" to the various points in the shop of which the driver required a clear view.

The method is very simple, yet very effective. From the information gained a small model of the ideal cab for that shop was built and given to the crane manufacturers, who were, in this instance, able to design the actual cab as almost an exact replica of the model. The crane is shortly to go into service and the steelworks' management is very pleased with it.

More recently the Human Factors Section has begun a study of visibility of open-hearth chargers: it is reasonable to suppose that some of the mishaps, including accidents to personnel, involved in the operation of open-hearth charging arise from the generally poor visibility which the driver has of his immediate surroundings. This work so far has consisted in mapping the areas of visibility around actual open-hearth chargers in operation. One of the facts revealed by the survey is the wide differences which exist between one machine and another in respect of visibility. At the least it can be asked that future open-hearth chargers will conform to the best chargers now in existence, and at the most perhaps the possibility will emerge of a new design which will provide maximum visibility. Again it will be noted that this is largely a matter of engineering design.

Finally will be mentioned a project in progress on protection of steelworkers from excessive heat. This topic is, of course, very relevant to melting shops, particularly in the wrecking and repair of open-hearth furnaces, and is being carried out under contract to BISRA by members of the Medical Research Council at Oxford. One of the main points here is the way in which scientific knowledge of the physiology of the human body in regulating its internal temperature is brought to bear on the practical problems of protecting human operators in hot conditions.

The work began with a survey of actual conditions found in steelworks and included several measurements made of conditions in open-hearth furnaces prior to and during wrecking and rebuilding. So far as radiant heat is concerned, when this is coming from one direction, adequate protection can usually be obtained by suitable reflective screening. In an open-hearth furnace, however, a man is surrounded by hot surfaces and requires all-round protection. The difficulty in encasing human beings in a simple reflecting suit in these circumstances is that the body itself produces heat which must be dissipated. A second difficulty is that reflecting suits now in existence are unlikely to retain their reflectivity for very long in the arduous conditions met with in a steelworks. The design of an air-ventilated suit is now well under way and a heat chamber is being planned in the Battersea laboratories in which a prototype suit of this kind will be tested in hot conditions comparable to those encountered in open-hearth furnaces. Subjects wearing the suit will be asked to perform a series of tasks in the "hot box" and the effectiveness of the suit in giving them protection will be measured.

Integrated Computer Control System

DESCRIBED as the first computer control system by a single company that combines instrumentation from primary elements to final controls, a completely integrated computer control system has been introduced by the American associates of Honeywell Controls, Limited, for large-scale industrial processes. Basis of the system is the Honeywell 290 digital computer, a general-purpose all-solid-state device specifically designed for process applications and incorporating major advances in computer technology. It is thus possible to obtain from one source a computer control system subject to a single responsiblity for concept, equipment, installation, service, maintenance, and the training of personnel in its operation.

The design incorporates high-speed internal operation, magnetic core and auxiliary magnetic drum memory, random access of input and output channels, and a special instruction vocabulary.

The Honeywell 290 is designed for a broad range of industrial applications, such as steel mill rolling and strip operations, electric power generation, and pipeline transmission of natural gas.

Top-blowing High-phosphorus Iron with Oxygen

A New Simplified Technique

This paper by K. G. Speith, H. Vom Ende, and F. Bardenheuer, translated from Stahl und Eisen, 1960, May 26, pp. 733-736, describes tests in a 3-ton converter of a newly developed lance which permits the distribution of oxygen between the bath and the slag to be varied as desired. The lancing technique developed produces low-nitrogen, low-phosphorus steel from high-phosphorus iron using standard coarse lime. Simplicity of operation and high productivity are claimed.

A NUMBER of processes have been developed during recent years for the top-blowing of high-phosphorus pig-iron using an oxygen lance. In the development described here the oxygen is blown in a manner closely resembling the LD process. The slag forming agents are added either at the beginning of the process or they are charged during the blow. The reaction vessel has been designed either as a stationary[1-8] or as a rotating [9-11] vessel.

All these techniques attempt to eliminate the phosphorus in the bath some time before decarburization is completed by the early formation of a reactive lime slag. While the metallurgical object —the production of a steel with properties similar to those of an O-H steel—could be attained, certain technical difficulties as well as long blowing times made the process economically less attractive[4].

A turning point was reached in the development of refining high-phosphorus pig-iron with pure oxygen, when the practice of top-blowing using both oxygen plus lime powder[11, 12] together was introduced. Good metallurgical results could thus be obtained for the first time in relatively short blows. However, in these processes most of the lime has to be crushed, sieved, and mixed with the oxygen in a given ratio. The resultant need for additional capital equipment makes the process both costly and rather complicated in comparison with the simple LD process.

Theoretical Considerations

The metallurgical department of the Mannesmann A.G. Hüttenwerk Huckingen, in evolving a simple and economical technique for top-blowing high-phosphorus pig-iron with oxygen realized[1, 6] that the lime addition had to be fluxed rapidly if dephosphorization was to be brought forward. A marked significance is attributed here to ferrous oxide as fluxing agent.

In the standard basic converter process the oxygen, introduced by the air blast, is used up to the flame drop for the oxidation of silicon, manganese, and carbon. Only a relatively small part of the ferrous oxide, formed at the same time, passes into the slag. Larger quantities of ferrous oxide will be available for lime fluxing in the slag, only after decarburization is almost completed, *i.e.*, where there is practically only iron left for oxidation. The conditions necessary for dephosphorization are thus formed. The phosphoric acid acting as fluxing agent assists in the decomposition of further quantities of lime, through which dephosphorization is accelerated.

During refining of high-phosphorus pig-iron with an oxygen lance, the oxygen jet impinges on both slag and bath. The process can be manipuated in such a way that considerably larger quantities of ferrous oxide are formed in the slag at the very beginning through the oxidation of high-splashing droplets and are thus available for lime-fluxing. In this way a highly reactive slag can be formed. A violent agitation of the bath constitutes the second important factor determining the speed of the process.

Special Lance Developed

From these considerations we developed a lance, which permits any desired oxygen distribution between bath and slag. A vertical narrow oxygen jet, which pierces the slag and impinges upon the bath, produces a violent agitation in the bath, which is further encouraged by the oxygen-carbon reaction. Another part of the oxygen, blown in a wide elongated cone upon the slag, serves for lime-fluxing. The vertical jet passes through the borehole in the centre of the distributor. The slag-fluxing part of the oxygen passes through a number of evenly distributed annular, oblique-lying channels, which produce the cone-shaped distribution of the jet. The oxygen distributor is connected to two concentric pipes. The oxygen for the central jet passing through the inner tube and that for the spray jet through the outer annular section are supplied separately. As a result, the oxygen flow in one pipe can be regulated independent of the flow in the other. If equal blast pressures are to be used in both pipes, there will not be any need

for separate controls for the two jets. The design of the lance will be simplified accordingly, as the oxygen is conducted through one pipe only and division into the central and annular jets occurs only in the head of the lance. Quite a large number of similar lances have been suggested in patent literature [14 15].

Earlier tests have shown that an excessive boil and the slopping associated with it, lead to serious delays in production[4]. The initial experimental blows were used for discovering firstly the causes responsible for boiling and, secondly, suitable remedies.

The carbon present in the high-splashing ferrous droplets reacts with oxygen or iron oxides with evolution of carbon monoxide. If this conversion occurs in a slag with a high iron content, the slag is blown upwards or violently ejected as lime-fluxing increases, especially in the presence of suspended iron droplets with fairly high-carbon contents. The high initial ferrous oxide content in the slag at which we had aimed must, consequently, be lowered again as lime-fluxing increases; this can be achieved by gradually reducing the oxygen supply to the slag. The lance is brought down, as a result of which the annular jet cuts deeper through the slag and the weight of oxidation is thereby transferred correspondingly more and more to the bath. The reduced oxygen supply to the slag is immediately reflected by a fall in the ferrous oxide content in the slag. This effect is clearly evident in Fig. 1. According to this graph, a lowering of the lance from 1.2 m. to 0.4 m. will produce a fall in the iron content of the slag from 28 to 5 per cent., keeping all other factors constant. Excessive boiling and slopping can thus be controlled by this simple expedient.

Tests in 3-ton Vessel

The tests were carried out on a 3-ton basic converter. After charging with hot metal 100 kg. coarse lime are added and the lance is lowered close to the surface of the bath. Ignition occurs as soon as the oxygen valve is opened. The lance is subsequently carefully raised, without the ignition flame

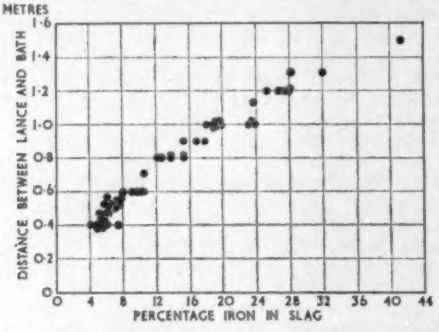

FIG. 1.—RELATION BETWEEN THE IRON CONTENT IN THE SLAG AND THE DISTANCE BETWEEN THE LANCE AND THE BATH SURFACE.

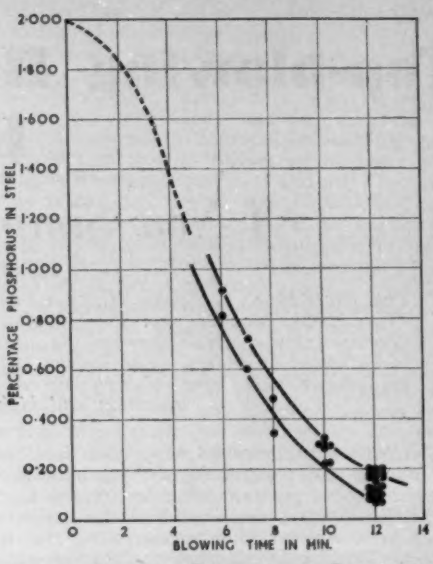

FIG. 2.—RELATION BETWEEN THE PHOSPHORUS CONTENT AND BLOWING TIME UP TO THE SLAG CHANGE.

being extinguished. The oxygen supply to the slag is relatively high at the greatest distance between lance and bath surface, through which adequate amounts of ferrous oxides are formed to ensure lime-fluxing. The lance is gradually lowered as soon as the first signs of excessive boiling appear. Care must, however, be exercised when lowering the lance that the ferrous oxide content in the slag is constantly kept close to the upper limit, favouring rapid and complete lime-fluxing; this means that a certain boiling action without slopping must be maintained to ensure an adequately high ferrous oxide content. The lance can, however, be lowered more rapidly in the last minute of the blow in order to reduce the ferrous oxide content in the slag to a minimum. Experience has shown that, at a slag temperature of at least 1,580 deg. C. and at a phosphoric acid content of over 20 per cent., this ferrous oxide content is approximately 5 per cent. If the iron content in the slag is less, the phosphoric acid will then no longer suffice to flux all the lime. The slag then becomes tacky and fouls the lining.

Not only the percentage of fluxing agent in the slag, but the time in which the lime remains in contact with the fluxing agent also plays a decisive role.

After a blowing time of 6 min. only fine grains of lime could be detected in the slag during our test series. Hence a considerable quantity of liquid slag with a high lime content is available for dephosphorization. Up to that moment the phosphorus content has fallen by about one half. Dephosphorization continues at a rapid rate, while

the remaining amounts of lime are being fluxed and after 12 min. the phosphorus content lies between 0.060 and 0.20 per cent. (Fig. 2). The process is controlled in such a way that at the end of this period the iron content in the slag is of the order of 5 to 8 per cent. and the temperature between 1,600 and 1,640 deg. C.

The temperature had to be controlled by the addition of cooling agents. In the first tests steel scrap was used for cooling (added after 8 min.), though in subsequent tests iron ore was substituted. The iron ore was added in small increments between the third and the sixth minute. Up to that moment, the higher oxygen supply could be balanced most effectively by manipulating the lance only. No reliable data can be supplied as yet on the ore and scrap consumption, as the discontinuous operation and the excessive cooling losses of the 3-ton vessel do not permit any conclusions to be drawn. Nor have we examined so far the effect of the type of cooling on the metallurgical character and on the length of the process. It may be possible that cooling by means of ore additions tends to speed up the lime-fluxing operation[1].

A quantity of oxygen, sufficient to leave about 1 per cent. C. in the bath at the end of this blowing period, is supplied. The agitation of the bath by the carbon dioxide evolved on combustion of the carbon exerts a favourable effect on the process. The decarburization reaction does not seem to have any retarding effect upon dephosphorization.

The slag is drawn off after the end of the first period; 30 kg fine lime per ton pig-iron are added. Blowing is resumed for another 2 min. The use of fine lime was deemed preferable as the blowing time of the second period was to be kept as short as possible. No tests have been carried out to check whether coarse lime could also be used for the second period as well. The iron content can be varied also in this phase by corresponding changes

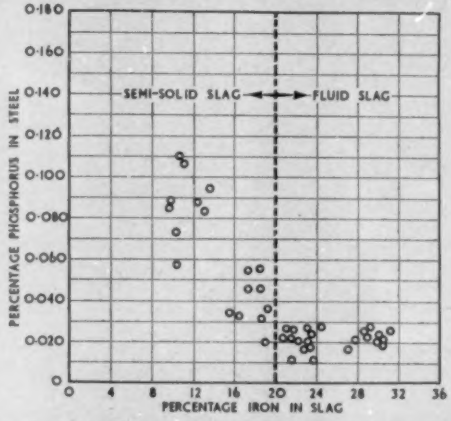

FIG. 3.—RELATION BETWEEN THE PHOSPHORUS CONTENT IN THE STEEL AND THE IRON CONTENT OF THE SLAG AT THE END OF THE PROCESS.

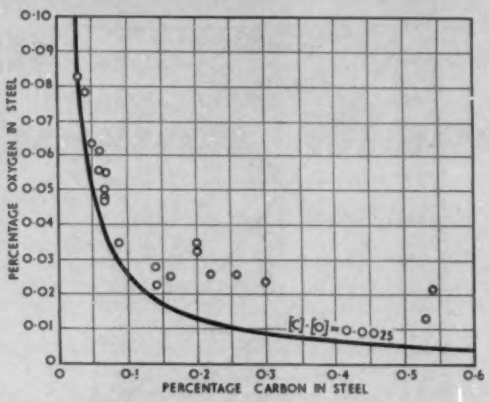

FIG. 4.—RELATION BETWEEN THE OXYGEN AND THE CARBON CONTENTS AT THE END OF THE PROCESS.

in the position of the lance. However, if the iron content in the slag is less than 28 per cent., the slag becomes almost solid and tends to become fragmentary in nature. A thick skull then tends to form on the converter lining. Hence the iron contents in the slag should be greater than 28 per cent. for it to be cleanly drawn off. Compared with the slag of the first period, a high iron content is needed because this slag contains only about 9.5 per cent. P_2O_5. However, if sand is added to the lime as fluxing agent, a fluid slag can be obtained with only 20 per cent. Fe. While the phosphorus content in the iron can be reduced without difficulty to 0.030 per cent. and less under a fluid slag, much higher phosphorus contents will have to be expected under a slag of fragmentary nature (Fig. 3).

When very low-phosphorus contents are desired, the sand addition should only be just high enough to saturate the slag with lime. Larger sand additions are permissible if the final phosphorus contents are allowed to be higher. As the iron content in the slag can be varied arbitrarily by corresponding variations of the distance of the lance from the bath, the iron content can thus be reduced without suffering any loss in the fluidity of the slag. High-silica lime fines, obtained at the screens in steelworks, may also be used instead of sand.

Results

Steel and slag possess the following values at the completion of the blow. Subject to the oxygen supply, the carbon content in the steel varies between 0.03 and 0.6 per cent. and averages 0.11 per cent. The steel has an average phosphorus content of 0.022 per cent. at an iron content in the slag of 20 per cent. and over. These phosphorus values were below 0.030 per cent. in all melts; 77 per cent. of a total of 23 experimental blows have phosphorus contents of 0.025 per cent. and less. The mean sulphur content was 0.017 per

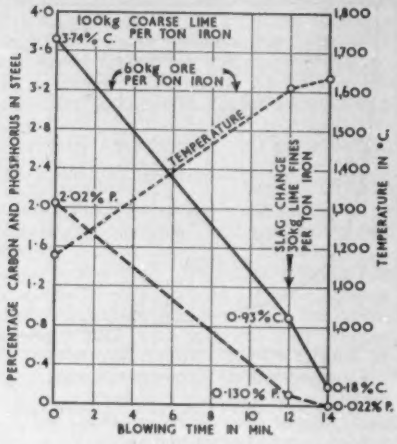

FIG. 5.—TYPICAL REFINING PROCESS IN A 3-TON CONVERTER.

cent. The values fluctuated between 0.012 and 0.027 per cent.

There exists a distinct relation between the oxygent content in the steel and the carbon content (Fig. 4). The values apply to the non-deoxidized steel. They correspond to those of open-hearth steel as observed repeatedly on earlier occasions[4, 16]. The nitrogen content diverges only negligibly from about 0.0035 per cent. The oxygen used for refining had a purity of 98.5 per cent. O_2.

The final slags had a mean iron content of 25 per cent. This is inclusive of the slags of the experimental blows, where the effect of higher iron contents upon dephosphorization had been studied (Fig. 4). The iron content in the final slag could always be kept safely within the limits of 20 and 25 per cent. Up to the decarburization of the iron, scrap-cooled blows consumed 60 to 64Nm³ (2,120 to 2,260 cu. ft.)/ton pig-iron, but ore-cooled blows consumed however only 48 to 53Nm³ (1,700 to 1,830 cu. ft.)/ton pig-iron.

Fig. 5 shows an example of the behaviour of the carbon content, phosphorus content, and temperature of a typical blow.

Sooner or later the question of the transfering the results of small-scale tests to large plant arises. The good reproducibility of the results from blow to blow, as regards to the phosphorus content at slagging-off and at the end of the blow, the avoidance of slopping, and the ease with which the most favourable iron contents in the slag could be maintained, suggest that there is a good chance that these small-scale results can also be successfully reproduced in large-scale plant. We shall be able to report on these results within a few months after tests on a 40-ton converter, which is being adapted to top-blowing.

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Rolling Mill Motor for Ravenscraig

THE armature of this 5,250-h.p. rolling mill motor for the new Ravenscraig plant of Colvilles, Limited, is being inspected at the Stafford works of the English Electric Company, Limited. It is one of two for a twin drive.

The Metal Industries Division of English Electric has a contract for all electrical equipment in three steel rolling mills at Ravenscraig, the biggest industrial project ever undertaken in Scotland.

SCALING TOWER for Russian Mines

RUSSIAN engineers from the USSR Trade Delegation to Great Britain, headed by their chief technical engineer, Mr. V. Gorbatsevitch, recently attended successful specification tests of a new type of mobile roof scaling tower. The tests, held at the Glazebury plant of the manufacturers, F. Taylor & Sons (Manchester), Limited, brought forth favourable comments from the Russian visitors.

The tower, shown in Fig. 1, is one of four now in production and forms part of the £250,000 contract for mobile mining equipment secured last autumn and is destined for use in Soviet mines in conjunction with Taylor mobile drilling rigs equipped with Holman drifters. There it will be employed for roof scaling, roof bolting, drilling, and general inspection purposes for mine roofs of up to 90 ft. in height.

Hydraulically operated, the machine consists basically of five telescopic sections mounted on an electrically powered crawler chassis. When fully extended the tower platform achieves a maximum height of 81 ft. and carries a safe working load of 660 lb. For travelling purposes the tower can be retracted (Fig. 2) and then pivoted through 90 deg. to rest on a sub-frame attached to the chassis. This results in a minimum overall height of 11 ft. 3 in., enabling the machine to move freely under relatively low headroom conditions. On reaching the desired working area the telescoped tower sections are raised to the vertical position to rest on a pivoted sub-frame by twin, doubie-acting rams. The outer tower section is then locked into position by tapered locating pins.

Adjusting for Verticality

At this stage it is necessary to ensure that the tower is vertical. Accordingly, the tower chassis is primarily levelled in the lateral plane by slewing on the crawler tracks until the level indicator situated in front of the driver moves to within prescribed limits. The tower is then adjusted longitudinally by means of twin, tower-levelling screwjacks attached to the chassis which raise or lower the sub-frame until another level indicator reads correctly.

The four support or stabilizing legs are now brought into action. These are fixed to the four top corners of the outer tower section and are secured alongside the tower when not in use. They are initially extended by small hydraulic rams, adjusted manually, and are then extended downwards by another double-acting ram until each of the four spiked feet is firmly embedded in the ground.

Maximum hydraulic pressure admitted to the rams is kept very low by means of a separate pre-set overload valve. The oil circuit to the rams is protected and locked by pilot operated non-return valves so that once set they cannot be altered until the work has been completed.

The tower is now extended by operating a push-button control on the platform which brings into action a double-acting hydraulic ram with a 14-ft. stroke. This is only attached to the first two sections, but a connecting system of wire ropes and pulleys ensures that any ram movement is imparted simultaneously to all sections. The time taken for the tower to reach maximum height from this position is 2¼ min. An interesting feature of this

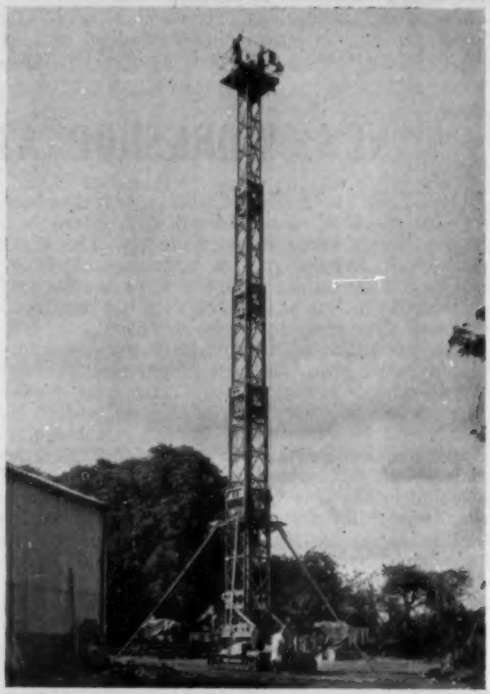


FIG. 1.—FRONT VIEW OF THE TAYLOR MOBILE ROOF-SCALING TOWER EXTENDED TO ITS MAXIMUM HEIGHT OF 81 FT.

ram hydraulic circuit is the inclusion of restrictor valves. These come into operation in the event of any pipe being damaged, ensuring that the tower descends at a relatively slow and safe rate.

Hydraulic power for all these operations is supplied by a hydraulic pump driven by a 7½-h.p. electric motor. This and the 40-h.p. motor for the chassis drive derive their power from a trailing cable connected to a 100-A plug and socket fitted to the chassis. This also provides power for two 300-W. lamps used to illuminate the mine roof and travelling and parking lights.

The chassis is constructed from steel channel members suitably cross braced and is mounted on crawler tracks interconnected through a single rocking beam centrally attached to the chassis. This method of suspension permits a limited articulation for travelling over rough ground. The tower can negotiate a maximum gradient of 1 in 10 and top travelling speed is about 1.05 m.p.h.

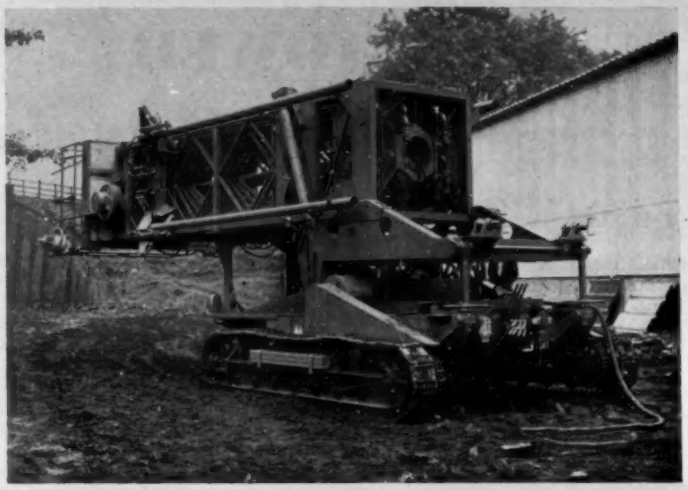


FIG. 2.—THE TAYLOR MOBILE ROOF-SCALING TOWER IN TRAVELLING ORDER, ILLUSTRATING THE LEVELLING JACKS AND THE STABILIZING LEG AND TOWER ERECTION CONTROLS.

Despite the machine's apparent bulk (26 ft. long and 10 ft. 10 in. wide), weight does not exceed 12 tons.

NEW WORKSHOP AT TURSDALE COLLIERY

ERECTED at Tursdale Colliery, near Durham, for the Durham Divisional Coal Board is a new workshop and ancillary buildings. The workshop block occupies an area measuring 300 ft. by 280 ft. and the walls are supported on a system of reinforced concrete beams. The floor is a reinforced concrete slab, generally 6½ in. thick and split into panels of 60 ft. by 20 ft., with expansion joints placed in the slab where stanchions pass through the floor.

At various points, rail tracks enter the workshops and here a 9-in. reinforced concrete raft has been placed under the 6½-in. slab and isolated from the main slab by expansion joints. The heavy machinery has been placed on mass concrete foundations and a number of reinforced concrete tanks, inspection pits, sumps, and ducts were included.

An administration block 230 ft. by 30 ft. is sited at the front of the workshops block and on the south side are the garages and paintshops, which are of similar construction to the workshops.

A boilerhouse occupying an area of 39 ft. by 53 ft. and sub-station 48 ft. by 25 ft. complete the new work. The floor is a reinforced concrete slab 6 in. thick, but thickened to 2 ft. under the boilers. Reinforced concrete stools approximately 7 ft. deep are used to carry the two boilers; the boiler foundations are isolated by expansion joints from the main floor slab. The boilerhouse is 22 ft. high and a reinforced concrete frame construction is used. The frames have been designed with pin joints at their feet, because of the low bearing capacity of the ground at Tursdale and it was desired that no moment should be carried down to the foundations. An underground coal bunker of reinforced concrete, with a capacity of 20 tons feeds by means of a conveyor two reinforced concrete hoppers each with a capacity of 7½ tons, which are suspended from the frames directly over the boilers which they feed. There is also a reinforced concrete platform cantilevered from the frame which carries a 1,000-gal. oil tank.

The roof of the boilerhouse is a 5-in. reinforced concrete slab carrying the pent house to the hoppers and roof lights. The foundations for the sub-station works are continuous with the floor slab and a 10-in. reinforced concrete roof of hollow steel mould construction, spanning 22 ft., was used.

The contractors were Holland & Hannen & Cubitts (Scotland), Limited, while the design engineers for the reinforced concrete were the British Reinforced Concrete Engineering Company, Limited, which also supplied the reinforcement.

ECONOMIC AND TECHNICAL IMPLICATIONS OF THE *Revised Plan for Coal*

Discussion on NACM Conference Paper

In a paper which he presented at the 1960 annual conference of the National Association of Colliery Managers, Mr. H. A. Longden outlined methods to be adopted to produce the cheap, clean coal necessary to assure the future of the industry in competition with oil and other possible sources of energy. The paper was published in our August 12 issue (p. 341). The ensuing discussion is reported below. Mr. Longden, who was recently appointed chairman of the West Midlands Divisional Coal Board, was formerly director-general of production of the NCB.

MR. W. SHARPE (past-president) occupied the chair and introduced the author.

MR. W. DUNCAN (Scottish Branch), speaking of progress in mechanization, referred to the use of machines in the 100-125-h.p. range, and said that the speed of development was still being held down by the voltage problem. In regard to ploughs, he asked if any progress was being made in producing them in this country.

MR. LONGDEN replied that substantial progress was being made in regard to the voltage problem, but it would be recognized that a great deal of work was involved. As Mr. Duncan had said, nobody in this country produced a plough. A lot of experimental work was being done to determine how they could improve the operation of the plough, but it was very much in the laboratory stage at the moment.

Expenditure

MR. G. INVERARITY (Midlands) commented on the large-scale installation of powered support systems and the board's decision to reclassify expenditure on them as a capital instead of a revenue charge. He asked if consideration had been given to keeping the expenditure on powered supports separate from the ordinary capital expenditure.

MR. LONGDEN replied that when the expenditure on supports was made a capital charge, which, in general, was very helpful, and when about six months ago they were working out the capital allocations for 1960, he went to a great deal of trouble to learn from the divisions whether they were being held up in putting the powered supports where they were wanted. This year they were putting in as many powered supports as the manufacturers could supply, and at places where they would give the biggest returns. The matter had been considered very carefully.

MR. C. F. PALMER (Yorkshire) said that the rapid increase of mechanization, particularly the installation of power-operated supports, would mean more maintenance. Whereas the need for manpower at the face would decrease, there would be more men needed to look after the equipment. The industry would become less dependent upon coal-face workers and more dependent upon specialists.

MR. LONGDEN agreed that in mining, as in all industry, with the advance in mechanization and automation, the tendency was to have fewer labourers and more artisans and trained and specialist men. The more equipment that was installed, the more people they must have to maintain it. The real point, of course, was that in so doing there was a very substantial overall saving.

MR. H. E. TYSON raised the question of the differences in piecerates between coalfield and coalfield and their effect on average output.

MR. LONGDEN replied that the differences between coalfields did have an effect. It was not an over-riding consideration, but it was important. In his view the only answer to the piecerate problem was work study. In America during the last 10 years the price of coal had remained more or less unchanged. While wage increases had been paid out of the proceeds of increased productivity, the industry had benefited also, and therefore had been able to hold its costs of production very nearly stationary. That was what they had to do in the British coal industry.

Concentration of Output

MR. T. L. CARR said there was reference in the paper to concentration of output, but the author did not say what organization was going to be needed. He invited Mr. Longden's comments on that. He also asked for some comment on the problem of getting sufficient numbers of trained fitters and electricians, which was quite serious in some areas.

MR. LONGDEN said the question of the organization which should be associated with concentration should really be dealt with in another paper. He would try to produce a brief written comment if it were thought to be helpful, for he could not

answer the question in the short time available at the meeting.

The problem with regard to fitters and electricians was recognized to be a very real and difficult one in some parts of the country. It varied enormously and he knew that in Warwickshire the situation was one of the worst.

Some six or seven years ago the board had very properly arranged a five-year course. The young men who were coming out from that course were proving to be well trained and qualified, and industry in general had pretty quickly come to the conclusion that they were the best lads available for that sort of work; consequently, the coal industry was at the present time experiencing a substantial loss. It was also up against the problem that by its regulations it could not take back or get back from other industries trained people and put them into responsible jobs, because they must serve for at least a year with the coal industry to become qualified as fitters and electricians in the mines.

Apparently the board was making too good a job of the training of these young men, because everybody else wanted them. Obviously the industry must get more of them into the mines.

MR. DEAN HARRISON, proposing, with very great pleasure, a vote of thanks to Mr. Longden, said he had presented an excellent paper, covering problems from the production of the coal at the face to the point at which it was put into the wagons. It was essentially the type of paper in which the members of the NACM revelled; it covered problems they were dealing with every day, and it gave information on the way that those who operated the industry from London were thinking.

MR. LONGDEN expressed his appreciation. He commented that about five years ago, when he had found himself in Hobart House, he went to a circus one evening and got hold of a second-hand tightrope. It was strong and would carry the colliery managers as well as himself. He had been walking it since, and he was improving! But he had not brought his umbrella to the meeting. The fact was that the problems raised by the meeting were just the problems that faced them all, the colliery managers and himself and his department, and he recognized only too well just how difficult it was to strike the right balance.

He thought the biggest difficulty of all, the one that was really holding them at the moment, was the production of large coal. As he had tried to emphasize, whatever they did or did not do, they could not let their customers down this winter. Taking a long interval in regard to the large-coal problem, one could see an answer to it. By the provisions of the Clean Air Act people were going to be compelled to use smokeless fuels, where solid fuels were used. The smokeless fuels—the cokes and the new solid fuels that were being developed—all required for their manufacture a small and clean coal. The railways, which by tradition had run entirely on coal, were turning over to diesels, and on some lines to complete electrification. If there were complete electrification of all the railways they would use a lot of coal. But it was quite certain that in the comparatively near future they would stop using coal altogether on the actual railways.

If they looked a little ahead they would see that a balance would be struck without any great difficulty; they should not then have a serious large-coal problem.

Tensioning of Cutter Loaders

COMPLETE control of the haulage rope tension of cutter loaders fitted with a "Clifton" wheel has been effected by a system designed by Mr. W. A. Summers, Area mechanization engineer, No. 1 Area, Northern (N & C) Divisional Coal Board. It can be applied to all machines operated by rope haulage, and gives full control of the tension in the haulage rope at a known safety factor. It eliminates the necessity for tensioning by hand-operated winches.

The arrangement when used with an Anderton shearer loader is as follows:—A hydraulic ram is attached to the face side of the armoured conveyor at the tail-end stable hole. The ram is designed to operate at pressures around 1,000 lb./sq. in., the pressure being adjusted to give the tension required on the installation. The haulage rope is anchored to the frame of the ram cylinder, and passes round a pulley which is attached to the ram. The action of the ram on this pulley imparts the desired tension to the rope. The rope is then carried to the machine where it is wrapped round the "Clifton" wheel, and then carried along the goaf side of the conveyor to the head end, where it is anchored to the conveyor through a tension control cylinder. This cylinder is connected by a pilot hydraulic circuit to the operating circuit controlling the pressure lines to the main tension cylinder, and allows the pressures in the main cylinder to be varied automatically to provide different tensions required for shearing or ploughing runs.

When the machine is shearing it is travelling towards the tensioning cylinder, the pressure in the cylinder being adjusted to give a suitable tension in the T1 side of the rope. Under these conditions tension in the T2 side of the rope which operates on the control cylinder is not sufficient to open the valve in this cylinder and thus opens the pilot hydraulic circuit. When the machine is ploughing, the tension transmitted through the control valve increases enough to open the pilot circuit: this in turn operates a spool valve which reduces pressure in the tensioning cylinder, giving a suitable T2 tension for the ploughing run. The system has given satisfactory results in initial trials in the Northern (N & C) Division.

G. & J. WEIR, LIMITED, Glasgow, licensed last year by Clark Bros. Co. Division of Dresser A.G. to build Clark centrifugal and reciprocating compressors, is now to manufacture also the Clark line of Isotemp packaged centrifugal air compressors.

COMPLETE COLD-FORGING PLANT

at Hanover Exhibition

CLAIMED to be the first of its kind in the world, a complete cold-forging installation has been developed by a British company after extensive research and field trials. It takes the form of a complete production line capable of accepting raw barstock at one end and ejecting the finished article at the other end. The installation was shown in operation for the first time publicly at the Hanover Machine Tool Exhibition, which closed on Tuesday.

The equipment shown at Hanover is being manufactured by two companies, one in the UK and the other in Germany—both members of the Camp Bird group. Altogether seven machines of the range were shown, including the essential basic units required for a complete cold-forging system. These are the cropping machine, the pre-forming unit, the combined de-burring and chamfering machine, the complete automatic cycle surface treatment plant, and the actual cold-forging machine.

Stringent Demand

Cold-forging techniques make accurately controlled use of the plastic flow properties of metals in a complex shaping process. This not only requires machines of exceptional rigidity, but also tools designed to withstand the enormous forces of cold forging in continuous operation. It has been the special achievement of the Camp Bird companies engaged in this venture to produce equipment which will meet these stringent demands. Although it will not completely displace chip-forming machining methods, there is a wide range of components in general demand which can be mass-produced by cold-forging at costs which are substantially lower than those of conventional systems. This is due partly to the large saving of material—a saving of 50 per cent. or more is not exceptional and stands in marked contrast to chip-forming machining. It is also due to the high production rate of up to 5,400 per hour in the case of some components and partly because these are formed from relatively inexpensive low-carbon rolled stock whose tensile strength is actually increased while being cold forged—sometimes almost doubled—thus leading to the production of a high-grade article.

New types of components are constantly being added to the growing list of applications of cold forging, as designers become aware of the immense potentialities of the system. Complicated shapes can in many cases be produced in only one pass and often require no further finishing operation. The prior surface treatment remains effective after the completion of the components which can then be stored for prolonged periods without any further protection against rusting or corrosion. Generally, this results in a simplification of storage problems and a further reduction of the costs involved.

Many attempts have been made during the last 60 years or so to achieve a practical application of the underlying principles and have met with varying—sometimes indifferent—success. However, it is only in comparatively recent years that the detailed scientific study of the parameters involved (studies with which the Camp Bird companies are intimately associated) led to the development of machines which in many aspects have completely revolutionized the manufacture of a vast variety of components, from simple nuts and bolts to highly complex parts which are currently being manufactured by this technique.

The size and number of machines in a complete installation will depend on the weight of blank it is to handle, but on the simplest basis will cost about £30,000 with a delivery of approximately 12 months.

THE "ROADRAILER"

at Earls Court

FEATURED on the stand of the Pressed Steel Company, Limited, at the Commercial Motor Show, which opens at Earls Court, London, today (Friday), is the "Roadrailer," the dual-purpose vehicle which runs on road and rail. It has been developed by the company's engineers in conjunction with British Railways and British Road Services. The prototype was built at Pressed Steel's railway division factory at Linwood, near Paisley.

Goods travelling by "Roadrailer" make their journey in three stages. In its lorry form the "Roadrailer" collects a load from the despatch point and takes it to the nearest railway station. There, its rail wheels are lowered—in the same fashion as an aircraft's retractable landing gear—and instead of holding up other traffic on the main roads, the load makes the main part of its journey as a freight car in a fast goods train. At the other end, the procedure is reversed, the rail wheels being retracted and the "Roadrailer" converted into a lorry trailer so that it is delivered as an articulated unit attached to a cab.

At the Commercial Motor Show, the "Roadrailer" will be exhibited together with a towing cab. A length of railway line will be laid on the stand and a small powerful motor will raise and lower the wheels so that the vehicle's adaptability can be clearly demonstrated.

THE FINNISH COMPANY Oy Vuoksenniska has ordered a wire-rod mill from Demag, according to Handelsblatt, Düsseldorf.

New Literature

NEW catalogues, booklets, and other publications which have recently been received include those mentioned below. Readers wishing to obtain a copy of any of the publications referred to should apply direct to the address given, at the same time mentioning IRON AND COAL.

BELMOS COMPANY, LIMITED, Bellshill (Lanarkshire)—Publication F810 gives details of Type RCS remote control station, which is suitable for the remote control of automatic contactor starters and similar applications.

DEMAG AKTIENGESELLSCHAFT, Duisburg—Contents of the latest issue (No. 158) of Demag News include articles on "Rapid Change-over of Continuous Light- and Medium-section Mills," "Demag Rotary Deep-drilling Rigs," and other items of equipment.

GOODYEAR TYRE & RUBBER COMPANY (GT. BRITAIN), LIMITED, Wolverhampton—Development of America's first high-speed automated belt calendering operation, which utilizes "X-ray eyes" to improve uniformity and quality, is the subject of a short article in the September issue of Goodyear Industrial Products News.

QUASI-ARC, LIMITED, Bilston (Staffs)—Even the non-technical reader will find Welding News of more than passing interest. The articles are quite short, very well presented, and cover many aspects of welding. The use of the company's products throughout the 45,000-ton P&O liner Canberra is described in the July issue.

MOND NICKEL COMPANY, LIMITED, Thames House, Millbank, London, S.W.1—The abstracts comprising the July issue of the Nickel Bulletin provide, in the diversity of their subject matter, an apt illustration of the wide range of industries and applications in which nickel plays an important role. The issue also contains the usual quarterly survey of recent patent literature.

BRITISH INSULATED CALLENDER'S CABLES, LIMITED, 21, Bloomsbury Street, London, W.C.1—"The Electrician's Mate" has been prepared to give a comprehensive coverage of mineral insulated cable work. It is intended primarily for those people who actually carry out the installations and, in consequence, it has been produced in pocket size. The booklet, copies of which are available at all BICC branch offices, should form an integral part of every wireman's equipment.

KEITH BLACKMAN, LIMITED, Mill Mead Road, London, N.17—Publication No. 52 covers by description, drawings, photographs, and capacity tables the new range of Tornado-Cyclogal high-efficiency dust collectors which are available in seven sizes, with normal rated duties from 160 to 42,500 cu. ft. of dust-laden air per min. The Tornado-Cyclogal settler offers not only an extremely low resistance to airflow, but also a high collection efficiency of particles down to 5 microns.

ANGLO AMERICAN CORPORATION OF SOUTH AFRICA, LIMITED, 40, Holborn Viaduct, London, E.C.1—Contributors to the September number of Optima, the quarterly review published in the interests of mining, industrial, scientific, and economic progress, include Earl Attlee, who, in an article on "The Practical Value of the Commonwealth," draws attention to the function of the Commonwealth in meeting the need for co-operation in a shrinking world. Other features of the issue include an article on "A Philosophy of Mineral Exploration," by Dr. B. B. Brock, a consulting geologist to the company.

IMPERIAL CHEMICAL INDUSTRIES, LIMITED, Imperial Chemical House, Millbank, London, S.W.1—"If you want a heat exchanger to cool electronic equipment in a rocket, a radome accurate to several thousandths of an inch, titanium rings for an aero engine, or a huge laminated plastic structure for a proton synchrotron (as Harwell does)—then the place for you to go to is the Marston Excelsior factory of ICI." So reads the introductory blurb to James Thurlby's article "Marston Can Make It!", in the September issue of the ICI Magazine. Most of the other contents in this entertaining and instructive publication (which costs a nominal 2d., by the way!) are very general in character.

PRESSED STEEL COMPANY, LIMITED, Cowley (Oxon)—First edition of 'Press' Express, in June, was printed as an experimental issue, but its reception warranted it being put on a regular basis. 'Press' Express No. 2, just issued, has a summer sporting flavour and has been printed on "sporting pink." Its contents are devoted not only to management affairs, but to the social, sports, and personal news of the company. The paper forms part of a new series of publications being issued to keep all levels of employee informed of trends and developments within the company. Later in the year will come the first edition of a full colour, fully illustrated magazine, Picture Press.

BRITISH TIMKEN DIVISION OF THE TIMKEN ROLLER BEARING COMPANY, Duston (Northants)—A most attractive brochure outlining the organization's training policy emphasizes that British Timken can offer the modern young man who wishes to be trained for a career in industry a share in a variety of industries, since there are few rotating parts to which anti-friction bearings are not applied. The complete training scheme consists of five sections described under the headings of craft, technician, student, commercial, and graduate apprentice. There is also a section on opportunities for female apprentices and trainees. Here is a cordial invitation to the youngster to enter industry and it is accompanied by full details of the prospects ahead of him.

New Defence Regulations

THE Ministry of Defence announces that the following documents in the Defence series have been published by the Stationery Office:—

DEF-24-A (May, 1960): Steel for forged or machined shell bodies and proof shot (unhardened steel) (2s.); DEF-103 (May, 1960): Steel for hardened and tempered high-quality coil springs for guns and armoured fighting vehicles (1s. 6d.); DEF-104 (May, 1960): Hardened and tempered coil springs of high quality for guns and armoured fighting vehicles (1s. 6d.); DEF-105 (May, 1960); Brass strip for cartridge cases and for caps (2s.); DEF-114 (May, 1960): Carbon steels for tools (1s. 6d.).

Safety in Mines Research

FORMATION OF FIREDAMP ROOF LAYERS

PROBLEMS associated with the formation of firedamp roof layers have been extensively studied at the Safety in Mines Research Establishment since 1958 and a sound understanding of this phenomenon has now been reached. The report of the SMRE for 1959 states that the formation is governed by a combination of the rates of emission of firedamp, the size and slope of the roadway, and the speed of the ventilating current. A parameter which shows the variation of methane layer velocity with ventilation velocity has been designed.

During 1959 a section has been established at SMRE to investigate actual incidents and provide men specially trained in the scientific aspects of mine disasters. The range of this work extends from the examination and testing of equipment that has failed in service, or has been impounded by HM Inspectorate, to the more detailed and lengthy investigations of serious explosions and fires. During the year the scientific aspects of eight underground explosions, a surface explosion in a methane drainage plant and a major mine fire were investigated.

Ignition by Electrostatic Sparking

In all the incidents investigated during the year, the causes of ignition were established with reasonable certainty. No new or unsuspected means of igniting firedamp was encountered, but the report draws special attention to two ignitions, as the hazards may not be widely appreciated. One of these was thought to be caused by an over-charged Hydrox shell and the other by an electrostatic sparking of a type that has been reported several times over the last 30 years.

The latter occurred when an accumulation of firedamp was being cleared from a stable hole by a blast of compressed air preparatory to shotfiring. The air was taken from the mains supply through a rubber hose to which was attached a steel coupling normally used to connect the hose to a drilling machine. Experiments with the hose and coupling showed that an electrostatic charge was rapidly generated on the coupling when air, carrying a small quantity of coal or limestone dust or particles of rust, was blown through the hose, and that when the charged conductor was brought near to an earthed conductor the discharge readily ignited firedamp.

In 1959 there were six reported ignitions of gas due to shotfiring including the first ever to be ascribed to Hydrox. The Hydrox device was of the type in which the shell can be reloaded with fresh cartridges underground. The shell in question was believed to have been overcharged. Laboratory tests have shown that such misuse can impair the normally high safety of the device without making the device more powerful.

Problems associated with haulage and suspension gear are prominent in the report on engineering research for 1959. The strength of components is often specified by saying that the ultimate strength must not be less than so many times the working static load. The report states that this is not a reliable method if unsupported by detailed stress calculations because failure may be by fatigue and not by simple static loading.

In the section studying pneumoconiosis much interest is being taken in the development of a gravimetric sampler for measurement of respirable dust. It is thought that measuring the mass concentration of respirable dust may ultimately prove more useful and more convenient than the current practice of measuring the particle-number concentration. The instruments now available for making such measurements need a compressed-air supply to operate them and this limits the scope of their use underground.

Attempts are therefore being made to make a self-contained instrument capable of operating for at least a shift without attention. Such an instrument, consisting essentially of an elutriator, dust collector, flow regulator, and power supply, can be designed in a number of ways. After considering such factors as simplicity, maintenance and weight, SMRE has designed a filter-type sampler powered by a small cylinder of carbon dioxide. The carbon dioxide passes through an ejector and creates sufficient suction to draw air through the filter.

During the course of a shift, a few milligrams of respirable dust from this air are deposited on the filter. Forms of the new instrument suitable for underground trials are being made and it is hoped that an instrument capable of sampling for a shift will weigh as little as 6 lb. and one capable of sampling continuously for two or three shifts will weigh about 10 lb.

FIRST AUTUMN MEETING of the north western region of the Combustion Engineering Association is to be held at the Engineers' Club, Albert Square, Manchester, on Tuesday. A paper entitled "Modern Fuels and Their Application" will be presented by Mr. D. C. Gunn, chief engineer of Cochran & Company (Annan), Limited.

Forthcoming Events

SEPTEMBER 26

Institution of Plant Engineers (West and East Yorkshire Branch):—Meeting at the Houldsworth School of Applied Science, Leeds University, at 7.30 p.m. "Fuel—Economy and Productivity," by K. Higginson.

SEPTEMBER 27

Institution of Plant Engineers (South Wales Branch):—Meeting at the South Wales Institute of Engineers, Park Place, Cardiff, at 7.30 p.m. "Electric Welding Applications for Plant Maintenance and General Fabrication," by C. V. Lewis.

Society of Instrument Technology:—Meeting at Manson House, 26, Portland Place, London, W.1, at 7 p.m. "Gas Sampling for Automatic Combustion Control," by R. Hardy, and "Smoke Density Measurement," by G. H. Laycock.

SEPTEMBER 30

Institution of Plant Engineers (Birmingham Branch):—Meeting at the Imperial Hotel, Temple Street, Birmingham, at 7.30 p.m. "Metal Stitching," by N. Tinwell.

OCTOBER 3

Institute of British Foundrymen (Sheffield Branch):—Meeting at the Technical College, Pond Street, Sheffield, at 7 p.m.

Society of Engineers:—Meeting at the Geological Society, Burlington House, London, W.1, at 5.30 p.m. "Some Notes on Hovercraft," by W. A. Crago.

OCTOBER 4

Institution of Engineers and Shipbuilders in Scotland:—Meeting at 39, Elmbank Crescent, Glasgow, at 6.30 p.m. Presidential address by J. Brown.

Institution of Production Engineers (London Graduate Section):—Meeting at 10, Chesterfield Street, London, W.1, at 7.15 p.m. "The Trade Union View on their Role in Improving Productivity," by A. Halliday.

Institution of Production Engineers (Oxford Section):—Meeting at the Town Hall, Oxford, at 7.30 p.m. "Recent Technological Advances in India," by F. W. Cooper.

Institution of Plant Engineers (Peterborough Branch):—Meeting at the White Lion Hotel, Church Street, Peterborough, at 7.30 p.m. "Modern Trends in Machine Tools."

Institution of Production Engineers (Nottingham Section):—Meeting at the Reform Club, Victoria Street, Nottingham, at 7 p.m. "Investment Casting for the Engineer," by I. L. Gwymm.

Institution of Production Engineers (Dundee Section):—Meeting at the Royal Hotel, Union Street, Dundee, at 7.30 p.m. "The Numerical Analogue Control of Machine Tools," by O. S. Puckle.

Institution of Production Engineers (Brighton Group):—Meeting at the Royal Pavilion Hotel, Castle Square, Brighton, at 7 p.m. "The Industrial Chemist and the Production Engineer," by H. J. Sharp.

Institution of Plant Engineers (Edinburgh Branch):—Meeting at 25, Charlotte Square, Edinburgh, at 7 p.m. "Good Communications," by A. W. Millar.

Institution of Plant Engineers (Leicester Branch):—Meeting at the Saracen's Head Hotel, Leicester, at 7.30 p.m. "Metal Stitching," by N. Tinwell.

Institution of Plant Engineers (Southern Branch):—Meeting at the Polygon Hotel, Southampton, at 7.30 p.m. "The New Factories Acts," by A. Simmons.

Junior Institution of Engineers (Midland Section):—Annual general meeting at the James Watt Memorial Institute, Great Charles Street, Birmingham, at 7 p.m. Chairman's address by E. Masters.

OCTOBER 6

Institute of Marine Engineers (Kingston-upon-Hull and Humber Area Section):—Meeting at the Royal Station Hotel, Kingston-upon-Hull, at 7.30 p.m. "Heatless Repairs to Fractured or Broken Castings," by N. Tinwell.

OCTOBER 8

North of England Institute of Mining and Mechanical Engineers:—Meeting in the Lecture Theatre, Neville Hall, Newcastle-upon-Tyne 1, at 2.30 p.m.: "The Use of Hydraulics with Coal Ploughing," by R. R. G. P. Jackson, T. Harris, and T. Sneddon.

OCTOBER 10

Institution of Chemical Engineers:—Meeting at the Royal Institution, Albemarle Street, London, W.1, at 3 p.m. Symposium on "Surface Effects and Liquid Behaviour."

OCTOBER 21

Mining Institute of Scotland:—Annual dinner dance, Central Hotel, Glasgow, at 6.30 for 7 p.m.

National Association of Colliery Managers

SEPTEMBER 28

Lancashire Branch:—Presidential address.

OCTOBER 3

South Midland Branch:—Meeting at Ashby-de-la-Zouch Rescue Station. "A Report on Safety, showing Accident Trends," by H. G. Mitchell and A. Chaplin.

OCTOBER 21

South Midland Branch:—Annual dinner and dance, Kings Head Hotel, Loughborough.

British Iron and Steel Industry Translation Service

FOLLOWING is a list of some new translations available from the Iron and Steel Institute under its translation service scheme. Translations are all classified by numbers, and these should be quoted on application, which should be addressed to the institute at 4, Grosvenor Gardens, London, S.W.1.

1592: "The Behaviour of Sulphur in Blast-furnace Smelting and Ways of Reducing the Sulphur Content of Pig-iron." V. G. Voskoboinikov. Stal', 1955, July, pp. 583-591. £6 5s.

1732: "Structural Changes in Steel During Resistance Annealing." V. N. Gridnev and V. I. Trefilov. Izv. Akad. Nauk S.S.S.R., OTN Met. i. Toplivo, 1959 (2), pp. 62-69. £5.

1744: "The Influence of Electro-deposited Protective Coatings on the Fatigue Strength of Steel." H. Tauscher. Draht, 1959, Oct., pp. 511-6; Nov., pp. 571-7. £7 15s.

1749: "Study on Welded Iron and Steel Works' Crane Bridges of the Box-girder Type: a Contribution to the Calculation of Thin-walled Box Girders." O. Schindler. Stahl u. Eisen, 1959, Dec. 24, pp. 1924-1932. £6 15s.

1780: "Oxide Inclusions in Iron-chromium-oxygen Melts" (with discussion). W. Koch, *et al.* Arch. Eisenhüt., 1960, May, pp. 279-286. £4 15s.

1823: "The Effect of Casting Technology and of Mould Surface Coatings on Ingot Quality." L. Smrha. Hutnik (Prague), 1959, vol. 9 (6), pp. 190-194. £5 5s.

New Steelworks in Yugoslavia

A new steelworks to be built at Skoplje will be the biggest industrial project in Macedonia, according to a British Broadcasting Corporation news report. It will produce 940,000 tons—a third of Yugoslavia's current output—annually. Construction will start next year, and in 1965 production will begin at the rate of some 300,000 tons per annum. The plant will have 10 electric furnaces and produce high-grade steel and steel sheet from domestic raw materials.

ROTARY TIPPLER WITH CREEPING-SPEED DRIVE UNIT

ALTHOUGH conventional friction drives for rotary tipplers ensure a great number of operations, the dissipation of the energy of rotation occurring after each cycle, on account of the short distance of retardation, causes shocks which place a heavy strain on the structural components and produce unpleasant noise. In order to eliminate these disadvantages Demag Aktiengesellschaft, Duisburg, has designed a creeping-speed drive, which is a combination of two electric motors with a sliding rotor brake. The design was based on the type of drive used in Demag hoists.

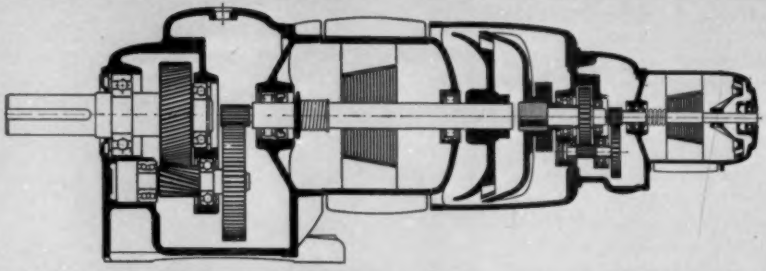


FIG. 1. — SCHEMATIC DIAGRAM OF THE DEMAG CREEPING-SPEED DRIVING UNIT.

The mode of operation of the drive eliminates a trip and locking device since the main motor drives the tippler hull at tipping speed and the creeping-speed motor moves the tippler hull into the correct loading position and does so at slow speeds without any shocks arising. During the loading operations the hull is held securely by a sliding rotor brake.

The gear-type creeping-speed drive unit shown in Fig. 1 comprises two matched motors each with a sliding rotor brake. The two motors are connected by an intermediate gear unit and a further reducing gear is arranged at the output end of the unit.

Each motor combines the features of an electric motor and a spring-actuated brake on the sliding-rotor principle. The main characteristics are the cone-shaped rotor and bore of the stator. The motor is always braked when at rest. After the motor has been switched off, or if the power supply fails, braking is effected mechanically. The rotor, which can be displaced axially in the roller bearings, is forced with the shaft and the brake disc with brake ring fitted to it against the braking surface by the brake spring.

When switched on, the cone-shaped form of the rotor and bore of the stator cause magnetic forces to be generated in the axial direction; these forces act against the brake spring and draw the rotor into the bore of the stator up to the limit determined by the bearings. The brake ring is thus released from the braking surface, and the motor can be run up to full speed without hindrance. The axial displacement of the rotor is about 1.0 to 1.5 mm. The service life of the lining of the cone-type brake disc is largely dependent on the frequency of braking, the moment of inertia to be

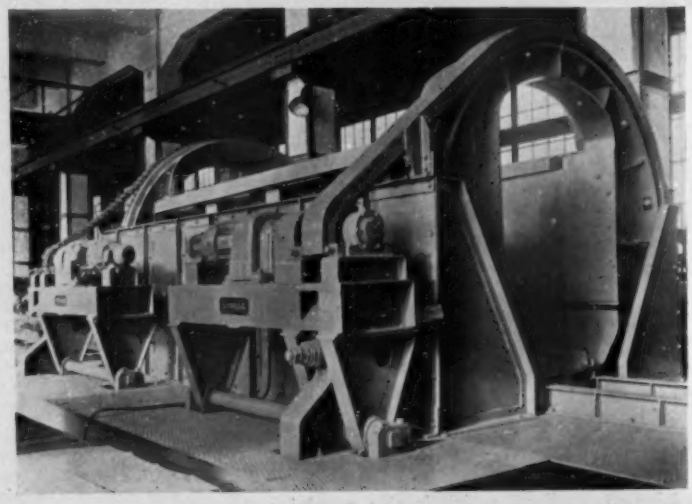


FIG. 2.—ROTARY TIPPLER WITH DUAL DRIVE FOR HIGH-CAPACITY MINE CARS.

braked against and the speed when the brake is applied, but about 3,500,000 brake applications may be made before the lining has to be renewed.

In the creeping-speed drive, the brake of the main motor serves as clutch for the creeping-speed motor. When both motors are cut out, the rotor of the main motor is held by the brake of the creeping-speed motor through the intermediate gearing and the rotor of the creeping-speed motor. When the main motor is cut in, the displacement of the rotor releases the brake and thus breaks the connection to the smaller motor.

If the creeping-speed motor is switched on when the main motor is switched off, its speed is reduced, via the intermediate gear unit, in accordance with the gear ratio. Its power is transmitted through the main motor brake acting as a clutch to the main motor rotor. The torques of both motors are equal at the end of the drive shaft. The creeping-speed drive is preceded by a double-reduction gear unit with gear wheels of hard-wearing special steel. The teeth are hardened and ground so as to ensure increased strength of tooth flanks. The thick-walled cast-iron casing has interior stiffening ribs and is thus able to withstand vibration.

The machine frame with the Demag gear-type creeping-speed driving unit mounted on it is arranged to oscillate about one axis. In this way, starting-up and braking shocks, even sudden blockages, are absorbed elastically and large structural forces do not arise. Fig. 2 shows a rotary tippler with a dual drive for high-capacity mine cars.

Coal Bunker Floor for Brickworks

BEING constructed for Geo. Armitage & Sons, Limited, at its Howley Park Brickworks, near Dewsbury (Yorks), is a bunker floor. A suspended floor 64 ft. by 50 ft. is to be constructed 11 ft. 6 in. above ground level. It has been designed for a 6-ton wheel load acting anywhere on the slab to allow coal to be tipped from lorries which move off the adjacent road on to the new slab.

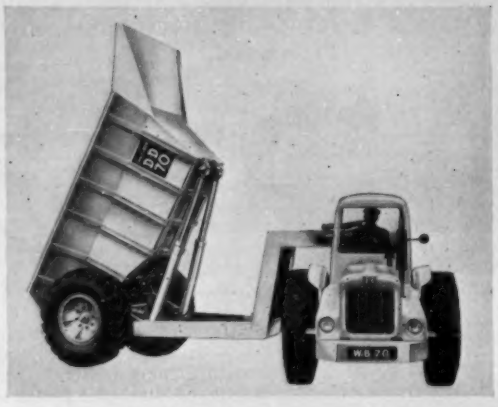
The reinforced concrete slab is 7½ in. thick, spanning between beams 1 ft. 1 in. by 2 ft. 7½ in. overall at 8-ft. centres. These beams, 50 ft. long, are of unequal spans due to the presence of a loading dock in the floor below and the projection of the existing building. They consist of two spans, 26 ft. 6 in. and 17 ft. 6 in., with a 6-ft. cantilever to the existing building. The 18-in. by 18-in. columns are at 16-ft. centres. The longitudinal beams therefore consist of four 16-ft. spans, each carrying the reaction from a cross beam at mid span.

The work is being done by direct labour, the reinforced concrete being designed by the British Reinforced Concrete Engineering Company, Limited, Stafford, which is also supplying the reinforcement.

New Range of Whitlock Equipment

EXCAVATOR shovels, trench diggers, ditch cleaners, dumpers, and hydraulic dredgers were included in an effective and, indeed, spectacular demonstration of a complete new range of equipment which marked the occasion of the official opening on Thursday of last week of the 100,000-sq. ft. factory extension of Whitlock Bros., Limited, Great Yeldham (Essex).

The Dinkum D-D 70 dumper, shown in the



THE DINKUM D-D 70 DUMPER.

accompanying illustration, will, it is claimed, move loads of 8 to 10 tons daily at a fuel cost of less than 10s. a day.

It operates satisfactorily over ground impassable for lorries, tractors, and trailers, and is suitable therefore for use in gravel pits, quarries, open-cast coal sites, etc.

Details of the Dinkum D-D 70 dumper and of other new equipment are given in attractive brochures.

Increased Productivity at Reduced Cost

Application of variety reduction to manufacture—"costs will be lowered and productivity raised"—is outlined in a booklet published by the British Productivity Council, 21, Tothill Street, London, S.W.1, price 5s., post free. It is emphasized that variety reduction does not mean restriction of consumer choice as a matter of course. Firms which have adopted variety reduction as a regular technique of management have been "deeply impressed" by the savings in time and materials, it is stated. The booklet "Variety Reduction" contains examples from 12 such concerns, including an electrical concern, which is saving a minimum of £25,000 a year by meeting requirements from stock drawings and components instead of redesigning.

IRON AND STEEL TRADE

PLANTS are now running to capacity and, almost without exception, entirely free of holiday influences, so that figures for September are likely to show a sharp rise in output of pig-iron, ingots, and rolled materials. Orders for structural steel and plate continue to increase but there is a strong and steady demand for all types of steel. This is particularly noticeable in recent reports of the call for reinforcing rods, small sections, and sheets. Stocks of raw materials are high and at Middlesbrough last month imports of iron and manganese ores reached the record total of 443,321 tons.

Pig-iron

Production of pig-iron keeps pace with demand and most consumers appear satisfied with supplies of their particular irons. The biggest outputs consist of basic pig-iron which the steelworks continue to take up fully and there is no difficulty in disposing of makes.

In the foundry grades of iron the low phosphorus brands are being taken up in substantial quantities by the engineering and speciality foundries for the production of high quality castings. The pressure for deliveries now shows signs of easing off, but the relief at present is only slight. Hematite is in good supply and refined irons are available to requirements.

Ferro-alloys

The demand for ferro-tungsten remains steady, while ferro-vanadium and ferro-molybdenum are reasonably active. Both the high and low carbon grades of ferro-chrome and ferro-manganese are in good demand. The major grades of ferro-silicon are well supported but interest in silicon metal is relatively light.

Moderate support is given to ferro-niobium, and ferro-titanium is quite active. There is a fair demand for chromium metal.

Semi-finished Steel

Full order-books still characterize the position for most re-rollers and the demand is sustained for small bars, light sections, and reinforcing rods. Present commitments can keep the re-rollers busy for months ahead.

In ordinary mild steel most of the re-rollers have plentiful supplies of semis, but the shortage continues for the high carbon and special qualities.

Finished Steel

Many mills are behind on their provisional programmes and deliveries in some instances are delayed, causing irritation particularly among structural engineers who have relied on the original delivery promise being kept. Plate makers are heavily committed, particularly for the thinner gauges and they too have had to extend delivery dates. A similar position obtains in the supply of chequer and floor plates.

Galvanized sheets, both flat and corrugated, are in good demand as are small angles, flats, rounds, etc. Reasonably good delivery promises can be obtained for cold rolled strip and good commercial quality bright drawn bars, but extended dates are offered for special and alloy qualities of bright drawn bars due to the difficulty in obtaining the necessary raw materials.

DERBYSHIRE AREA NUM has included in its 1962 programme £10,000 towards the establishment of athletic clubs in the Area.

Associated British Engineering Trading Improvement

TRADING improvement is reported by Associated British Engineering, Limited, diesel engine manufacturers, of London, W.C.1. There was a consolidated trading surplus of £229,130 for the year ended March 31, 1960, compared with a deficit of £11,406. As for the previous year, no dividend is recommended on the £1,100,000 ordinary capital. Group net profits total £54,779 after tax of £52,188. A net loss of £98,823 was incurred in the previous year, after a tax credit of £100,702.

Profits for 1959-60 exclude those of Henry Meadows, Limited, the equity in which was sold before the end of the financial year. Further development expense was incurred by the free piston engine company, which has again been written off out of general reserve and the major contract for construction of the world's largest free piston power station at Singapore is now in an advanced stage of completion.

Subsidiaries in the marketing of earth-moving equipment have experienced a fall in business, due mainly to reduction in open-cast coal mining. New products and new markets are being actively developed.

Renishaw Iron Blast Furnace Relit By Lord Plowden

LORD PLOWDEN, deputy chairman of Tube Investments, Limited, on Monday relit the No. 1 blast furnace of the Renishaw Iron Company, Limited, near Sheffield, "blown out" three months ago for re-lining. Built and first lit in 1955, it has been producing about 75,000 tons of high grade pig-iron per year. Lord Plowden said that in the past five years the company had increased production by 35 per cent., against a manpower increase of 10 per cent.

Mr. C. H. T. Williams, chairman of the company, was present at the lighting, and Mr. H. H. Draycott, director and general manager of Renishaw Iron presented Lord Plowden with a silver salver to mark his first visit to the company and its special occasion.

There was a short service of blessing of the furnace, conducted by the Rector of Eckington, the Rev. C. S. Branson.

MINERS AT Easington Colliery (Co. Durham) have created a new record by producing 26,105 tons of coal in one week. This was 9,105 tons more than the target and over 1,000 tons higher than the previous highest figure.

Coalfield News

Lancs NUM Secretary Says Farewell

AFTER more than 15 years as Lancashire Area secretary of the National Union of Mineworkers, Mr. Edwin Hall is retiring tomorrow (Saturday). Speaking at a presentation ceremony at Bolton at the weekend, he said that if he had to start again at the age of 13 he would still choose the mining industry. The miners were the "bedrock" of the country's economy, and their steadfastness had helped pull the country through two major wars.

Mr. Sidney Ford, president of the NUM, presented Mr. Hall with first-class tickets for his wife and himself for a month's cruise to Bermuda as a gift from the Lancashire miners and friends in the coalfield. Col. G. G. H. Bolton, chairman of the North-Western Divisional Coal Board, was among those who praised Mr. Hall's services to the coal industry and the miners. Mr. Hall is to continue to serve the union by looking after its welfare interests in the Area and will be available for consultation.

The new general secretary is Mr. J. Gormley (43), a coal-face worker. He beat nine candidates with 13,188 votes, a majority of 5,174 over his nearest rival, ex-Communist Mr. J. Hammond, who polled 8,014 votes.

TOTAL of the Six Bells Colliery Disaster Fund is now over £85,200.

AFTER nearly 50 years' service with the South Hetton Coal Company, Limited, Newcastle-upon-Tyne, and later with the National Coal Board, Mr. Robert Gray has retired.

COAL AND COKE shipments from South Wales ports last week were, at 45,232 tons, 14,905 tons less than the previous week and 12,867 tons less than the corresponding week of 1959.

MORE THAN 100 members of NUM branches in South Wales were guests of the Derbyshire Miners' Welfare Holiday Centre at Skegness last weekend. They studied the running of the centre and will report back to South Wales.

COAL-FACE WORKER at Linby Colliery (Notts), Mr. B. W. Wass (32), was killed when a 2-ton stone fell on him while placing roof supports after an automatic coal-cutting machine had passed, it was stated at an inquest at Hucknall on Tuesday. Verdict of Accidental Death was returned.

A 50,000-TON DROP in coal shipments from Sunderland in August is attributed by the River Wear Commissioners to the seamen's strike. Shipments totalled 95,000 tons, compared with 143,000 tons in August, 1959. During the first seven months of this year coal shipments rose by 75,910 tons to 365,017 tons.

A VERDICT OF Accidental Death was returned at a Doncaster inquest last week on Mr. George Albert Nelthorpe (31), who died on August 25, two days after being released by rescue workers when he was trapped for five hours 2,000 ft. below ground at Markham Main Colliery following a roof fall.

FITTER employed with the North-Western Divisional Coal Board who solved a £30,000-a-year problem for the board in 10 minutes has been awarded £100. He is Mr. Douglas French (30), of Standish (Lancs), who replaced a brass washer in a coal-cutting machine with a thrust bearing which he machined himself.

NOTTINGHAMSHIRE FARMER, Mr. Raymond Plant, has confounded the agricultural critics of open-cast coal mining. He has just harvested the finest crop of oats he has ever grown from 21 acres which a few months ago was producing coal. "The open-cast people have done a far better job of reclaiming than I could have done," he said.

SANDWELL PARK COLLIERY, West Bromwich, where all available workable coal has been exhausted, closed on Friday last. Transfers of some men have already taken place and of the remaining 160, 134 men are being transferred to other collieries. It is expected that work will be found for a number of the remaining 20 or so men and that redundancy will be negligible.

COAL SHIPMENTS from the Tyne, which have been badly affected by the five-week-old strike of seamen, are estimated to be running almost 200,000 tons behind the corresponding total for 1959. The slump is in coastwise shipments as export cargoes are showing some improvement on last year. Total shipments last year of 5,700,000 tons were the poorest since 1945.

DECISION TO MAKE an application for an interim injunction immediately to prevent further open-cast mining on a site at Rhiwfawr in the Swansea Valley was taken at a special meeting last week of Pontardawe RDC Plans and Public Works Committee. The meeting was called to consider what might be done to prevent recurrence of damage to local properties from blasting.

YORKSHIRE AREA vice-president of the National Union of Mineworkers, Mr. S. Bullough (50), has been elected president in succession to the late Mr. J. R. A. Machen. He received 43,978 votes and his opponent, Mr. J. Kane, a Communist, received 27,862. Mr. Bullough is a member of the national executive of the NUM and a member of the National Consultative Council for the coal industry.

RETIRING CHAIRMAN of the National Coal Board, Sir James Bowman, won his own cup for the best leek at the annual show of Burradon (Northumberland) Social Club on Saturday. His home is about a mile from the club at Woodlands, Killingworth. Sir James's entry measured 137.9 cu. in. Mr. S. Greenwell, manager of Burradon Colliery, won second prize, and Sir James's son, George, was also a prizewinner.

ORGANIZED BY the Durham Divisional Coal Board, the divisional civil defence and the finals in the division's civil defence and firefighting competitions will be held at Dame Margaret Hall, Washington, tomorrow (Saturday). The events include underground and surface team and individual tests and judging will be by officers of the Fire and Rescue Brigade of Durham and Northern (N&C) divisions of the NCB.

NCB PAYS FOR MINERS TO BECOME BRITISH

FEES of foreign miners working in the Area who wish to become British citizens are being paid by the West Midlands Divisional Coal Board. A spokesman for the division said at the weekend that the scheme has been in operation for 18 months. "Last week we paid for 46 miners to insert the necessary advertisement in the Press applying for naturalization. The total cost was between £20 and £30."

The scheme was suggested to the board by Mr. Jim Southall, Area organizer of the National Union of Mineworkers, as a means of avoiding any difficulties that may arise when a foreigner is transferred from a redundant pit. "There can be trouble when they are put in jobs over the heads of British workers," he said.

THE COAL TRADE

IT was all very well for the National Coal Board to accompany its announcement of a 10s. per ton rise in coal prices with the notice that all orders booked after the announcement would be at the new prices. Many customers felt they deserved (and would get from their merchants) a few days' grace at the old prices and in consequence merchants had one of the worst weekends in recent memory. The position was already difficult with pressure for supplies building up earlier than usual and everyone imagining that traders could call upon unlimited experienced labour and endless efficient transport.

DURHAM AND NORTHUMBERLAND

The increase in the price of coal resulted in an immediate rush by consumers anxious to order before the operation of the increase and some merchants are inundated with requests which usual stocks at this time of the year are quite unable to meet.

Possibly because of unfavourable weather, domestic demand has been rather more expansive for the time of year and this is a pattern which the market displays generally. The position maintains its better tone in spite of the seamen's strike and collieries are quite satisfactorily booked between now and the end of the year. Durham and Northumberland large, graded screens, Durham coking coal, and industrial cokes are all well placed. In the export section, there is a fairly steady volume of business coming forward.

SCOTLAND

Glasgow—The supply position is gradually tightening as the effect of curtailment in output becomes more noticeable, but generally speaking there is still a comfortable balance. House coal tonnages are adequate, although not always in the desired quality. This is particularly noticeable in the case of group 2, where the best coals are scarce. A good demand is met for groups 5 and 6 and merchants are adding these steadily to their bings, which at the various depots now aggregate 250,000 tons, the same as last year. Householders are slow to lay in a stock, principally because of financial considerations.

The reaction in the industrial sector to the price rise has been very sharp, and suggestions of going over to oil are most persistent. In the meantime supplies are fairly comfortable, although slight interruptions have occurred through the occasional shortage of wagons. Singles are fully taken up, and sales of doubles are increasing. Washed and untreated smalls are moving out well, especially coking qualities. Duff presents little problem to the marketing authorities. Metallurgical coke is in brisk demand, but supplies are adequate.

Anthracite stove nuts are quieter than usual, but although merchants are holding a sizeable stock this is earmarked for their regular customers who have just been slow in taking up delivery. Interest in smokeless fuels is gradually increasing. "Coalite" is giving satisfaction to more and more consumers, and sales of "Phurnacite," "Rexco," and other patent fuels are increasing, albeit slowly. Hard coke nuts are plentiful to meet a restrained trade, and gas coke is also in good supply.

SOUTH-WEST LANCASHIRE

The outlook in the domestic coal trade was completely changed by the sudden announcement of price increases and merchants everywhere were overwhelmed with orders. Many have had an extremely difficult time owing to the refusal of householders generally to accept the position.

Supplies of house coal are, on the whole, fairly satisfactory but are insufficient to meet quickly the sudden excessive demand which has developed. It is expected that during the next week or two business will return to normal, but there may be another rush of orders before the seasonal advance takes place towards the end of October. While the trade welcomes this increased business it could do with it a little more evenly spread over the year.

In the gas coke market the price increases announced by the North Western Gas Board, consequent upon the increase in the price of coal, have also stimulated the demand to a considerable extent and here again distributors have been able to accept only a limited number of orders at the old price. Hard coke maintains a steady trade for engineering and general industrial purposes.

Coastwise trading, in spite of the recent advance in house coal prices, remains steady but without any change of note, and it is expected that there will be a somewhat increased demand mainly for Northern Ireland and the Isle of Man. The business to Eire, which has made such a valuable contribution to the Merseyside ports in past years, is not expected to show any appreciable revival.

Average retail prices per ton are as follow:—Group 1, 192s. 8d.; Group 2, 173s. 3d.; Group 3, 156s. 5d.; Group 4, 144s. 8d.; Group 5, 131s. 7d.; Group 6, 121s. 5d.; Group 7, 107s.

SOUTH WALES

Swansea—The position over the whole area during the past few weeks has been difficult for dealers, with demand mounting and supplies from the collieries at their lowest for many months.

All merchants report full order-books, which will take many weeks to clear at the present rate of supply.

DERBYSHIRE

Pressure for all types of domestic coal is very strong, and all tonnages despatched to merchants are being promptly sold, so that no opportunity to improve the stocking position at wharves presents itself. Best and hand-picked qualities are keenly sought, and there is some delay in execution of recent orders. The better types of screened cobbles and brights are in firm request, and here too delays in delivery are more noticeable. Cheaper brights find a ready market, but supplies are tight. Best large nuts now find a much readier market, and forwardings are on a steady scale. Washed medium and small nuts experience a firm request, and although reasonable despatches are

evident against contract in most instances, additional tonnages could be accepted.

Demand for domestic coke nuts remains fairly firm in spite of price variations, with many consumers anxious to obtain delivery before winter prices operate at the end of the month. Premium smokeless fuels are likewise actively sought, and supplies are coming to hand more slowly on the whole. Domestic grades of anthracite are in fair request, and despatches are subject to considerable delay for all qualities. "Phurnacite" is also coming to hand more slowly, and recent arrivals find a ready market.

Industrial coals are subject to a constant demand on the whole, and most grades are moving forward well. Dry screened nuts are fully taken up, but deliveries are on a satisfactory scale. Washed fuels are in better demand, and while there are some delays at local landsales, most inquiries are attended to fairly promptly. Hard steams are in steady demand, and reasonable dispatches are reported. There is fair pressure for all grades of coke. Gas coke is readily obtainable from local works, but there are some delays in the receipt of hard coke.

WEST MIDLANDS

Demand for house coal continues at a high rate. There has not been such severe pressure for many years, and most merchants are fully committed for many weeks ahead. Dispatches from local coilieries have been up to the level of merchants' contract quantities, though these have not always been in keeping with the qualities and sizes nominated. To cope with the rush of orders, merchants have been lifting depot stocks and these are now seriously below the usual level. All large coal is fully booked for some time to come, although house nuts are to be had fairly freely. Other fuels suitable for the open fire have been under buying pressure, especially the well-known brands. A heavy demand for all fuels for the central-heating market has also developed. Anthracite coals of all sizes are difficult to obtain, stove nuts and beans being the most difficult. Dry steam nuts are tight, and because of railway delays there is some hold-up in the execution of orders for "Phurnacite." Householders are now placing orders for domestic coke in increasing quantities, but here supplies are in excess of demand.

The call for industrial coal has not so far been affected by the rise in prices. Trade throughout the district is booming and demand is matched by availability. Stocks of industrial coals at collieries are substantial, though they are principally in the form of boiler slack. Manufacturers have built-up reasonable stocks while the public services have also accumulated stocks to meet any interruption in supply during winter. The market for hard coke has again strengthened and there is a lively demand for all classes. Producers of blast-furnace coke are fully extended, while general engineering descriptions are attracting more support. Orders are not so numerous for hard coke nuts. Foundry coke remains a strong feature.

LEICESTERSHIRE

The acute shortage of house coals continues and tonnages received at depots have been quite insufficient to meet demands placed on merchants. All classes of house coal are short, and supplies outside programme tonnages are unobtainable. There is a marked shortage also of smokeless fuels of "Rexco" and "Coalite" type, but despatches of "Cleanglow," in which consumers continue to show great interest, are more readily available. Shortage also persists with all grades of anthracite. There are plentiful supplies of all grades of domestic coke, however, and dispatches by rail are prompt and roadborne traffic is easily loaded.

A shortage of practically all grades of industrial coal is beginning to show. All grades of doubles, D.S. nuts and singles are now in heavy demand. The central heating market is now getting into swing and orders are being placed forward for regular deliveries. Supplies of the larger types of gas, hard and foundry coke are mostly dispatched promptly by rail.

NORTH WALES

Demand for house coal continues keen. Very little additional coal is on offer, and what little there is available is quickly absorbed. Even the most expensive coals are several weeks in arrears with deliveries.

The same applies to anthracite, "Phurnacite," and other smokeless fuels.

The one bright spot is coke. All grades are readily available, and consumers' requirements are immediately satisfied. Industrial needs are catered for satisfactorily.

NCB-NUM Discussions on Pit Closures

JOINT discussions between representatives of the National Coal Board and the National Union of Mineworkers in the various divisions are expected to begin very shortly on the board's plans for pit closures during 1961. Details of the closures were outlined by Sir James Bowman at a meeting of the industry's National Consultative Council this week.

Thirty-five pits are due to be closed next year—11 fewer than planned for this year—and about 11,000 miners will be affected. Of the 35 pits, which produced 3,700,000 tons of coal last year, 22 have exhausted their "realistic reserves," while eight are to be used as "manpower reservoir pits" until the miners can be absorbed elsewhere.

Only five small or medium-sized pits will be shut for economic reasons, compared with six pits last year. In the board's five-year programme, announced last year, it was estimated that it would be necessary to close between 35 and 70 pits for economic reasons. The number of five is therefore smaller than would be necessary to meet this programme. The other closures would become necessary before long whatever the board's policy.

BRITISH OXYGEN GROUP TRADING CHANGES

MARKETING arrangements of the British Oxygen Company, Limited, group are to be reorganized. At the close of business on September 30, the British Oxygen Company is to take over the trading business and assets of six wholly-owned subsidiaries, and it will resume trading in its own name from October 1.

The six subsidiaries are: British Oxygen Gases, Limited, British Oxygen Engineering, Limited, Quasi-Arc Company, Limited, Sparklets, Limited, A. Charles King, Limited, and British Oxygen Research & Development, Limited.

NEWS IN BRIEF

THE US ENGINEERING FIRM, Ingersoll Rand, is to build a large factory at Dalmuir, Clydebank. It intends to employ 600 men and 80 women in a modern plant producing heavy compressors and rock drills.

MILLER & COMPANY, Chicago, has been appointed exclusive sales agents for the Tonawanda Iron Division of American-Standard. The division produces merchant pig-iron in special grades for foundries and other melters throughout the US.

AS PART OF an internal reorganizing Firth Cleveland, Limited, has formed a new subsidiary, Firth Cleveland Fastenings, Limited. The new company will bring together various group interests concerned with different types of fastenings.

MASTER CUTLER, Mr. P. J. C. Bovill (managing director, Newton, Chambers & Company, Limited) travelled from Sheffield to London and back by rail on Wednesday to mark the introduction of new Pullman stock for the Master Cutler train.

FOLLOWING the conclusion of an agreement entered into earlier this year between the International Harvester Company of Great Britain, Limited, and SA de Construcciones Agricolas of Sevilla, an initial 1,000 sets of IH tractor components are shortly being shipped to Spain.

MORE THAN 900 members and delegates of local authorities, Government departments, national fuel industries, private industry, and other organizations will attend the 27th annual conference and exhibition of the National Society for Clean Air to be held at Harrogate from October 5 to 7.

UNDER AN AGREEMENT recently concluded with Ateliers des Charmilles, SA, Geneva, Wickman, Limited, Coventry, has assumed the sole selling agency in the UK for the Eleroda Model D.1 electro-erosion machine, a high-precision spark machining unit particularly designed for tool-room applications.

THE NEW National Lending Library for Science and Technology at Boston Spa (Yorks) will be one of the largest library sites in the world, Dr. D. J. Urquhart, senior principal scientific officer of the Department of Scientific and Industrial Research, told the Library Association's annual conference at Scarborough last week.

NEGOTIATIONS are being made by Ashmore, Benson, Pease & Company, Limited, Stockton-on-Tees, for the sale of its foundry, which the company had planned to close. If the sale is successful the jobs at the foundry will be preserved, otherwise the closing process will be carried out gradually and there will be no sudden redundancies.

SPEAKING IN SINGAPORE last Friday, Mr. Hisakuni Ohzawa, leader of eight Japanese industrialists on a three-week visit to Malaya to study the iron ore industry, said Japan would increase its imports of Malayan iron ore next year to 5,000,000 tons, compared with an estimated 4,000,000 tons this year and 3,000,000 tons last year.

CRITICISM of Richard Thomas & Baldwins, Limited, was made at a meeting of Newport (Mon) Council by Ald. J. R. Wardell, who said that people were being "crucified" by the heavy traffic travelling to the site of the Spencer steelworks, which RTB is building at Llanwern, because "five years' work was trying to be done in one year."

NEW Mylamaque Explorations Company, Limited, has completed arrangements with Koppers, Limited, Canada, and Strategic Materials Corporation for the construction of a Canadian smelter to produce pig-iron by Strategic's direct production process. The smelter site is near Kingston, Ontario, and production is expected to begin in the middle of 1962.

STEEL production in the US this week is estimated by the American Iron and Steel Institute at 1,537,000 tons, compared with 1,510,000 tons (revised) last week. The seasonally adjusted index of industrial production in the US for August was 109 (average 1947-49 equals 100). This compares with an adjusted index of 110 (revised) for July and 103 for August, 1959.

NEW APPRENTICE TRAINING SCHOOL, the first of its kind in the area, which has been opened at the Stanningley (near Leeds) Works of George Cohen Sons & Company, Limited, increases the works capacity for apprentice training from 25 to 50 apprentices at any one time. It will provide for basic training before apprentices move into the works for craft training.

RECORD 443,321 tons of iron and manganese ore was imported at Middlesbrough last month. Ore imports at Hartlepool were 80,174 tons, while ore imports for the UK reached a record monthly total of 1,688,000 tons in August—nearly 500,000 tons better than in August last year. It is estimated that ore imports this month will exceed 400,000 tons at Middlesbrough and 60,000 tons at Hartlepool.

PENSION and life assurance schemes for all adult male workers of Arthur Balfour & Company, Limited, tools and tool steel makers, of Sheffield, and associated companies, are to begin on October 1. They will be for men between the ages of 21 and 64 who have worked at least one year with the group. The scheme will be "substantially better than that proposed by the State," says Lord Riverdale, chairman.

TIN SMELTING plant is to be built on the Jos Plateau, in Northern Nigeria, by the Consolidated Tin Smelters, Limited, at the suggestion of the Nigerian Government. A new company is to be formed to build the plant. Up to now Nigeria's production of tin concentrates has been sold under contract to another Consolidated Tin subsidiary, Williams, Harvey & Company, Limited, which has a smelting works at Bootle (Lancs).

CONSTRUCTION of five coal-carrying ships, which will be sold to an American company and then chartered by Japanese steel mills, has been authorized by the Japanese Transport Ministry. The carriers, each of 35,000 tons, will be built for the American Naess Shipping Company, and will then be chartered by Japanese steel mills to transport American coking coal from the US to Japan at cheaper rates than those now charged by Japanese ships.

AUSTRIAN State-owned steel concern, VOEST, is to spend the equivalent of about £18,750,000 over the next three years on expanding production capacity. Initial plan is to reach an annual capacity of 2,300,000 metric tons of raw steel, and 1,600,000 tons of rolled steel. The project includes an ore harbour and installations to be built at the VOEST port next year, a fifth blast furnace at the company's Linz works, and a new rolling mill.

TEN-DAY visit to Stockholm was won by Mrs. Cynthia Lewis, 25-year-old secretary to Mr. W. L. Fairless, Cardiff branch manager of Atlas Copco (Great Britain), Limited, compressed air engineers, of Wembley (Middx), who gained the title of "Miss Atlas G.B."

in a contest run by her employers. There were more than 50 contestants, who were judged on regularity of attendance at work, attitude to customers, and interest in the company's policy and progress.

Mr. DAVID COY, an employee at the Steel, Peech & Tozer branch of the United Steel Companies, Limited, Rotherham, who made a suggestion of working improvements to his own company, has been given an award by the Appleby-Frodingham Steel Company branch of United Steel. His suggestion of a speedier way of detecting wear on fabric bearings has been tried out in the Appleby 15-in. mill and adopted after proving to be successful.

MINING INSTRUCTION at Nottinghamshire's newest college, the Arnold and Carlton College of Further Education, which opened on Monday, differs slightly from that usually given in that there is an amalgamation of the pre-senior course and the National Certificate course. This it is claimed, will lead to more efficient selection at the end of the year for the specialized academic (National Certificate Course in Mining) and craft (General Certificate in Mining) courses.

COAL PRODUCTION in the East Midlands has a bright future, and output is expected to rise by up to 5,000,000 tons by 1965, said Mr. N. Fricker, marketing director of the East Midlands Divisional Coal Board at Leicester last week. Any closures of collieries would be from natural causes only, and these would be offset by developments elsewhere in the division. The demand for coal for power stations was expected to rise from 44,000,000 tons to 55,000,000 tons by 1965, he added.

DISMISSAL notices served on 350 engineers and machinemen employed by R. B. Tennent, Limited, Whifflet Foundry, Coatbridge (Lanarkshire), were withdrawn last Friday. About 120 moulders and labourers were paid off because they refused to work overtime and work was slowed down so that the management was compelled to serve notices on the remaining workers. Last Friday, however, the foundrymen told the management they were willing to resume work.

ACCORDING TO FIGURES issued by the Dutch Ministry for Economic Affairs, some 12 per cent. more coal and oil was imported into Holland over the first half of the current year than in the corresponding period of 1959. This compares with a rise of only 6 per cent. in the first half of 1959 over the same period for the previous year. At the same time, Holland's exports of metal products (excluding ships) were higher by 20 per cent. in the first half of 1960 than in the first six months of last year.

UNDER THE AGREEMENT between the Newton, Chambers & Company, Limited, group, Thorncliffe, near Sheffield, and the Koehring Company, Milwaukee, US, NCK-Rapier, Limited, London, S.W.1, becomes exclusive selling agent for the Koehring Company in the eastern hemisphere (excluding Japan). In addition to the Koehring excavator-crane models built under licence by Newton, Chambers at Thorncliffe, NCK-Rapier will now sell Koehring cranes and other equipment built in the US but not yet made in England.

DELEGATION from the Soviet Scientific and Technical Committee of the USSR visited Leeds this week during a tour arranged jointly by the Association of British Manufacturers of Printers' Machinery and the British Federation of Master Printers. On Tuesday the party toured the works of R. W. Crabtree & Sons, Limited, newspaper and off-set machinery makers, and of George Mann & Company, Limited, printing machine makers. Mr. John Exley, sales manager of R. W. Crabtree, left on Thursday on a reciprocal visit.

Holidays Still Affecting Coal Output

ALTHOUGH holidays are still affecting coal output in some divisions, total production last week recovered to 3,720,300 tons, bringing the total for the year so far to 136,541,500 tons. This is just over 6 per cent. down on the comparable total for 1959. Consumers' stocks increased very slightly to 13,324,000 tons and undistributed stocks showed a correspondingly slight fall to 34,689,000 tons.

There were 590,300 wage-earners on colliery books on September 10, against 649,400 on September 12, 1959, the numbers engaged at the coal face being 224,200 and 252,300 respectively. Total absenteeism (all workers) in the week ended September 10 was 14.49 per cent. compared with 14.63 per cent. in the week ended September 12, 1959. Output at the face was 3.896 tons and overall 1.365 in the week ended September 10, compared with 3.656 and 1.310 tons in the week ended September 12.

The following table gives (in tons) the output of saleable mined coal by division in the week ended September 17, and the tonnage lost through all causes (holidays, disputes, and go-slows):—

Division.	Week ended September 17, 1960.		Week ended September 19, 1959.
	Total output.	Tonnage lost.	Total output.
Scottish	330,200	18,700	357,600
Northern (N&C) ..	245,800	—	259,600
Durham	466,500	—	466,700
North-Eastern ..	783,700	18,900	830,500
North-Western ..	230,300	23,200	259,900
East Midlands ..	830,200	33,700	859,700
West Midlands ..	255,500	500	302,900
South-Western ..	384,900	5,200	399,100
South-Eastern ..	26,700	—	32,300
Great Britain—			
Deep-mined coal ..	3,553,800	100,200	3,768,300
Other deep-mined (including licensed mines) ..	40,200	—	56,900
Open-cast coal ..	126,300	—	194,900
TOTAL ..	3,720,300	100,200	4,020,100

Strikes Not Justified, Pit Deputies Told

PIT deputies at Bentley and Maltby collieries (Yorks) were criticized on Saturday by their national president, Mr. Laurie Wormald, for staging recent lightning strikes over an alleged shortage of under-officials at their mines. Speaking at Barnsley at a meeting of the Yorkshire Area council of the National Association of Colliery Overmen, Deputies, and Shotfirers, Mr. Wormald said that there had been some aggravation at both collieries, but strike action had not been justified.

Urging under-officials to settle their disputes by conciliation machinery at pit level, Mr. Wormald said: "We must remember that when under-officials strike, many other men suffer a great loss." Mr. Wormald said negotiations were taking place with the National Coal Board in London for a wage increase.

The council approved the purchase of new headquarters in Church Street, Barnsley. The property was formerly used by the North-Eastern Divisional Coal Board's No. 4 Area marketing staff.

Anderson, Boyes Expansion Plans Jeopardized

PLANS for the expansion of the new Glenrothes works of Anderson, Boyes & Company, Limited, makers of coal-cutting machines, conveyors, and mining type switchgear, may have to be shelved if the valuation assessment of £8,000 on the factory is not reduced.

In a letter of protest to the Secretary of State for Scotland, Mr. William Hamilton, Labour MP for West Fife, states that the valuation put on the factory suggests that premises at Glenrothes are being rated higher than in other parts of Scotland and present indications were that the 1961 valuation would be even higher.

If that was so it would be very problematical if Anderson, Boyes would consider any expansion in the future "and indeed if they continue at all." Mr. Hamilton urges that such high ratings would seriously jeopardize the future of industrial development at Glenrothes and this at a time when the future of the coal industry in the area was, to say the least, unpredictable.

A further protest against factory valuations in the New Town of Glenrothes—which, he claimed, were the highest in Scotland—was made by Dr. Arnold O. Beckman, president of the US company, Beckman Instruments, Incorporated, when he announced on Tuesday that the company is to have a £100,000 extension in about a year's time.

Dr. Beckman said the plant must be able to operate on a competitive basis. "If, for any reason, including that of excessive rates, the company is unable to maintain that competitive position, as directors responsible to our shareholders we could not continue to invest in this area. We should feel obliged to invest our money in a more favourable economic climate."

Another Firm Considers Jarrow for Development Plans

INFORMING Jarrow Corporation Industries Committee that it was likely to need another factory soon and Jarrow was being considered as a possible site, Smart & Brown (Machine Tools), Limited, Biggleswade (Beds), has expressed the hope that local workers would not be averse to working under modern production methods including work-study techniques, "otherwise it would be a waste of time to carry out any exploratory work."

The committee is to refer the company to existing good labour relations, absence of unofficial strikes, and the willingnesss of workpeople to adapt themselves to new methods. It is still trying to persuade the Pressed Steel Company, Limited, to reconsider its decision to cancel its factory project at Jarrow because of local AEU opposition to work-study methods and wage rates.

APPRENTICE aged 15, Kenneth George Moorhouse, employed with Alldays & Onions, Limited, foundry and general engineers, of Birmingham, was killed three days after joining the firm when a pin in the hook of a crane sheared and catapulted the pulley and cable at his head. A verdict of Death by Misadventure was returned at last week's inquest.

Obituary

MR. JOHN HENRY FULLER

MR. JOHN HENRY FULLER, industrial relations officer for the No. 2 (Doncaster) Area of the North Eastern Divisional Coal Board, who died last week at the age of 60, had served in the coal industry since 1913. He started as an underground trainee at Brodsworth Main Colliery and worked at the pit, including the coal face, until 1940 when he became Area safety board workmen's inspector covering 20 pits in the Doncaster district.

Assistant labour officer to the No. 4 (Carlton) Area from 1947, he became Area labour officer for Doncaster—redesignated to his present title in 1956—in October, 1950. Mr. Fuller served on Brodsworth Main branch committee of the National Union of Mineworkers from 1928-34 and for six years was NUM delegate to the Yorkshire Area Council. He also served as treasurer of the Checkweigh Fund and on Brodsworth Welfare Committee, and for a year on the Yorkshire Area Executive Committee.

MR. GEORGE ARCHER

THE death occurred on Tuesday at the age of 64 of Mr. George Archer, president of the Mond Nickel Company, Limited. Mr. Archer began his career in the Civil Service and after experience in Customs and Excise, Import Duties, and other Government departments he was transferred to the Raw Materials Department of the Ministry of Supply on the outbreak of the last war.

He joined the Ministry's mission in Washington in 1941, became its head in 1945, and was also UK Secretary of the Combined Raw Materials Board. In 1948 he joined the board of Mond Nickel, becoming sales director in 1952, chairman of the company in 1959, and president last July. He was also president of the Mond Nickel subsidiary, Henry Wiggin & Company, Limited, and a director of the Anglo Metal Company, Limited.

Mr. WILLIAM T. CUNNINGHAM, who has died at the age of 52, was a director of the Warrington Wheel Company, Limited.

The death has occurred at the age of 47 of Mr. LEONARD FREDERICK HALE, since 1952 accountant and assistant secretary at the Bolsover offices of Coalite & Chemical Products, Limited.

Mr. RICHARD SHARP, former general manager of blast furnaces of the Stanton Ironworks Company, Limited, near Nottingham, died in hospital aged 74. He joined Stanton Ironworks in 1926, and retired seven years ago.

The death occurred on Monday of the MARQUESS OF READING, the Rt. Hon. GERALD RUFUS ISAACS. He was 71. Lord Reading, who was Minister of State for Foreign Affairs from 1953 to 1957, was in 1938 chairman of the Coal Valuation Board, which carried out its work in the long vacation of that year. Among other offices held in the years following the second world war, he was chairman of the Central Valuation Board Panel of Arbitration and Panel of Referees under the Coal Industry Nationalization Act.

Orders Placed

£362,000 Contracts for General Electric

TWO contracts totalling £362,000 have been placed with the General Electric Company, Limited, by Richard Thomas & Baldwins, Limited, for the new Spencer Works at Llanwern (Mon). One covers nine 1,500 kW, 460 V, steel-tank mercury-arc rectifiers with associated transformers and earth-leakage and regenerative control panels to provide power for cranes and mill auxiliaries. The other is for the complete electrical equipment for a 62-in. wide continuous pickle line.

The different sections of the pickle line equipment are driven by Ward Leonard controlled variable-speed motors totalling over 5,000 h.p. Control desks located at each end of the line are included in the contract as well as a large number of a.c. drive motors.

SHEFFIELD WELDERS, LIMITED, has secured an important contract for work in the Maramba group of mines, Freetown, South Africa. Mr. J. H. Spillings, managing director, flew out on Monday to take charge of the work and four specialist welders have also gone out.

ORDERS TO THE VALUE OF over £1,250,000 have been received during the last three months by the National Gas & Oil Engine Company, Limited. The most recent is for fourteen 1,000 b.h.p. diesel engines covering a power range from 285 to 1,550 b.h.p., received through the company's Canadian associate, Orenda Industrial, Limited.

CONTRACT worth about £600,000 has been gained by Lodge-Cottrell, Limited, a member of the Simon Engineering, Limited, group, for the supply of electrofilters for Nos. 7 and 8 boilers for the Central Electricity Generating Board Blyth "B" power station. The plant will consist of three combined mechanical collectors and electrostatic precipitators per boiler unit, each precipitator being of the three-stage horizontal flow high-efficiency type, provided with automatically controlled high tension transformer rectifier equipment, and the overall efficiency of the plant is guaranteed at 99.3 per cent. at C.M.R. rating.

EXTRA heavy duty roll grinding machine costing £41,000 has been ordered from Craven Bros. (Manchester), Limited, Reddish, Stockport, by James Booth Aluminium, Limited, for installation in its Kitts Green Works, Birmingham. The machine will be used—among other purposes—to grind the rolls of the company's new 148-in. four-high hot aluminium rolling mill which is planned to be in operation during 1961. It will accommodate rolls up to 62 in. diameter, 26 ft. long and weighing up to 75 tons, and is designed both for rough grinding and for obtaining a first-class, ripple-free surface finish. A superfine in-feed of 0.0001 in. per revolution of handwheel is provided.

COMPLETE automatic welding installation for the fabrication of "penstock" pipes has been ordered by Sulzer Bros., Winterthur, Switzerland, from Quasi-Arc Company, Limited, Bilston (Staffs), a subsidiary of the British Oxygen Company, Limited. The pipes are used for water conveyance in hydro-electric schemes, and vary between 16 in. and 8 ft. in diameter. The installation, which is being designed and built at Quasi-Arc's Gateshead works, will produce all the internal and external longitudinal and circumferential seams in pipe sections up to 13 ft. long and weighing up to 6 tons.

£1,000,000 Cape Asbestos Bid for Small & Parkes

OFFER worth just over £1,000,000 for the "A" and "B" ordinary stock of Small & Parkes, Limited, belting and brake lining makers, of Manchester, has been made by Cape Asbestos Company, Limited. The offer is on the basis of five Cape Asbestos 5s. ordinary shares for eight Small & Parkes "A" and "B" 5s. ordinary stock units. At Tuesday's closing prices for the Small & Parkes stock, the bid is worth 1s. 9d. a share to holders of "A" stock and 2s. 9d. a share to holders of "B" stock.

The directors of Small & Parkes intend to accept the offer in respect of their own holdings and recommend acceptance by other shareholders. In announcing the maintenance of the 5 per cent. interim dividend in respect of 1960, the directors of Cape Asbestos state that the group turnover for the first six months shows an increase over the corresponding period of 1959. Holders received a total of 20 per cent. for 1959.

Law Report

OVERMAN'S ESCAPE IN BLAST

SHOTFIRER who pleaded guilty to two breaches of the Coal Mines Explosives Regulations following an explosion in the First South district of Craghead Colliery (Co. Durham) was fined £10 on each charge, with £3 3s. costs, at Stanley Magistrates' Court. He was William Oliver (55).

Mr. W. Kinghorn, prosecuting, said that a fore-overman, Mr. Carroll, was only 6 ft. from the shot when it went off and narrowly escaped being blown to pieces. The shotfirer should have posted a sentry, he said. Mr. R. W. Farr, defending, said that it was not a flagrant breach, although the precautions laid down had not been taken. Oliver shouted along the face, and two pullers who had been working there had moved to a safe distance. He thought he had taken steps to ensure that no one was there. Mr. Oliver had already lost £70 in wages through being suspended by the colliery, added Mr. Farr.

"The overman was not injured, but it was only by the grace of God that he wasn't," said the chairman, Mr. A. S. Davison.

Atlas Copco Acquires Swedish Drilling Firm

SHAREHOLDERS of Atlas Copco, AB, the Swedish compressed air engineers, have accepted the proposal to increase the share capital from 63,000,000 kr. to 76,650,000 kr. by the issue of 546,000 shares at a par value of 25 kr. each to shareholders of Svenska Diamantberg Borrmings, AB, a Swedish company with oversea associates, which specializes in drilling operations for testing soil, rock strata, mines, and ore deposits.

This follows acceptance by holders of 97 per cent. of Diamantberg shares of the Atlas Copco acquisition offer, made in June this year.

FURTHER orders from the British Transport Commission for five 10-ton dockside cranes and eight 7½/3-ton dockside cranes, all for service in Hull, have been received by Stothert & Pitt, Limited, Bath (Som).

Gas Purification & Chemical Expands in Plastics Field

ENTIRE £45,000 capital of Precision Plastics, Limited, and a 77 per cent. majority of the shareholding in Plyglass, Limited, have been acquired by Gas Purification & Chemical Company, Limited. It is intended to transfer to Precision Plastics the plastics division of A.B. Metal Products, Limited, an existing subsidiary of Gas Purification.

The consideration for the purchase of Precision Plastics was £77,500 in cash, and for the 29,814 shares acquired in Plyglass, and the assignment of an unsecured loan of £20,000 was the issue of 23,000 shares of 5s. each in the capital of Gas Purification credited as fully paid up. It has been indicated to the outstanding shareholders of Plyglass that the remaining shares would be purchased at the price of 10s. per share.

Conference on Fitting Jobs to Suit Workers

REPRESENTATIVES from nearly 200 industrial organizations are to take part in the Ergonomics Conference organized by the Department of Scientific and Industrial Research, which opens at the Connaught Rooms in London on Tuesday. Ergonomics, the application of science to the problem of fitting the job to the worker, aims at improving industrial efficiency by designing equipment so that its operation is within the mental and physical capacities of the average person. It takes into account the complexity of the job and working conditions such as noise, lighting, and temperature.

Ergonomic principles have already been applied to a number of industrial problems, and practical examples of these will be seen at an exhibition linked with the conference, which will last for three days and is to be opened by Lord Hailsham, Minister for Science.

Pay Workers Every Fortnight, Advice to Industry

SPREAD of the banking habit to the wage-earner was welcomed by Mr. H. J. Witheridge, public relations officer, Midland Bank, one of a panel of speakers who discussed payment of wages at a meeting organized by the British Institute of Management in London on Monday. He warned, however, that if this sort of system was suddenly adopted throughout the whole of industry it would impose a burden upon the banks which, physically, they could not support.

He did not foresee any great change in the general pattern of methods of salary payment for the next 10 years. What the banks would like to see from industry in general was payment of wages at fortnightly intervals rather than weekly, possibly in round amounts to the nearest pound or 10 shillings, and a possible staggering of pay days to relieve the banks' burden.

The meeting was under the chairmanship of Mr. C. W. Griffiths, secretary and treasurer, Joseph Lucas (Industries), Limited.

End of an Australian Aluminium Partnership

THE Consolidated Zinc Corporation, Limited, and the British Aluminium Company, Limited, are to end their joint association in the Commonwealth Aluminium Corporation, Limited, by mutual agreement. British Aluminium, now controlled by Tube Investments, Limited, and Reynolds Metals, has been associated with Consolidated Zinc for the past three years in planning for further development of the aluminium industry in Australia.

The companies said in a joint statement on Monday that considerable progress had been made towards establishing alumina and aluminium production based on the bauxite resources at Weipa, Northern Queensland, and at Gove, in the Northern Territory. With the consent of the Australian Government the Gove aluminium lease was being transferred from Commonwealth Aluminium (Comalco) to British Aluminium.

The Government has also agreed that British Aluminium would stand in the place of Comalco in negotiations for the purchase of the Government's interests in the New Guinea Resources Prospecting Company, Limited, accompanied by assurances of grants of rights in relation to the Purari River system. British Aluminium was making appropriate financial adjustments with Comalco, and Consolidated Zinc would buy British Aluminium's half interest in Comalco.

Thyssen Seeks Bigger Interest in German Steel Firms

APPLICATION has been made by August Thyssen-Hütte, AG, to the high authority of the European Coal and Steel Community to acquire half the share capital of two other West German steel companies, Stahl-Und Walzwerke Rasselstein, and Handelsunion, AG, part of the Otto Wolff concern. Thyssen-Hütte now holds about a quarter of the equity of both companies. Another quarter of Handelsunion equity is owned by Thyssen-Hütte's sister company, Phoenix Rheinrohr, and an equal amount by the Rheinstahl concern. It is understood that Rheinstahl might be ready to sell its share.

In the case of Rasselstein, majority control lies with the Otto Wolff concern, and under the Thyssen proposals this would remain so. The Thyssen and Otto Wolff concerns have a long-term arrangement under which Thyssen-Hütte—which makes mill tinplate—supplies coils to Rasselstein, and Rasselstein products are sold by the Wolff trading organization. Wolff has given Thyssen an option to increase its Rasselstein holdings up to 50 per cent.

The Otto Wolff concern confirmed on Tuesday that it had applied to the High Authority of ECSC for permission to take over a further 25 per cent. of the ordinary shares of Stahlwerke Bochum. If the application succeeds, Otto Wolff will acquire a further 25 per cent. of Stahlwerke Bochum's share capital from a banking consortium to get a majority. The company said that the connection between the two firms would strengthen their competitive ability in sheet metal production.

CLLR. MRS. A. M. WILKINSON, a member of Urmston (Lancs) Urban Council, has been appointed a member of the Domestic Coal Consumers' Council.

Company Meeting

POWELL DUFFRYN LIMITED

THE Annual General Meeting of Powell Duffryn Limited was held on September 21 in London, Sir Henry Wilson Smith, KCB, KBE (the Chairman), presiding. The following is an extract from his circulated statement:—

I feel that the results of the year 1959-60 are not unsatisfactory. To me, and I hope to you, the most vital figure by which to test our strength and future is the Group's Trading Profit, after depreciation but before tax. For the previous two years, primarily because our new and growing activities were not yet able to take the strain of the substantial unavoidable fall in earnings from the Group's coal and shipping business, I had to report to you successive falls of £204,000 and £318,000 in total a reduction of over 25 per cent. from the figure of £2,036,000 which had been attained in 1956-57.

Now, and again in the face of further reductions in traditional, and especially coal, profits, I am glad to have a better story to tell. The increase of £354,000 in Trading Profits is, I believe a significant turning point, especially if we can look forward to an improvement in our shipping earnings and at least some degree of stabilisation in our coal business. As regards shipping, much will depend upon an early solution to the current labour troubles in the industry.

Diversified Range of Activities

Diversification is regarded as a modern term, whether of abuse or of praise. The first point to realise in relation to the Powell Duffryn Group as now constituted is that for many years before the Second World War its individual Companies were engaged in a very diversified range of activities—**coal** (production, distribution, export, international trading, overseas companies and depots); **oil** (especially the first developments of storage and bunkering); **shipping** (as owners and managers essentially coastal in character but also as shipping agents and brokers for overseas as well as home business); **engineering** (mainly at the heavy end of the industry, particularly in relation to the needs of collieries and railways); **timber business** (at home and abroad).

The second point I would make is that, while the central core was eliminated when the Group's collieries and colliery investments were expropriated under the Coal Nationalisation Act, much remained as a base on which a new future could be built. An important step was the reorganisation of the capital structure in 1954-55 when payments in excess of £11 million were made to the Powell Duffryn shareholders, primarily by way of return of capital. In the result, Powell Duffryn is neither some kind of investment trust nor a so-called industrial holding company but the parent of a broadly based Group of industrial and commercial companies, with central control of policy combined with decentralisation of operation, much inter-weaving of management from the parent Board downwards, and a great deal of common interest based on our history but adapted to modern conditions.

A year ago, in the final paragraph of my Statement, I said "The development and expansion of activities which are appropriate both to us as a Group and to the unfolding pattern of industrial and commercial progress remains the main plank of your Board's policy and is well within our compass." That statement still stands.

Coal

The Powell Duffryn Group still has a large stake in coal—no longer as producers but as distributors, exporters, and international traders. Inside the United Kingdom, we have much the biggest individual share of the coal trade tonnage left to private enterprise. In spite of what is happening in the fuel and power world and in spite of other developments inside our own Group, it is our policy to hold and, where practicable, to increase our coal business. Naturally, in recent years, we have taken some hard knocks. In the three years 1957 to 1959 inclusive the total home demand for coal has fallen by no less than 27 million tons. Our own Group figures have dropped by over five million tons, including a further significant fall last year. If, however, regard is had to the forward programme of the National Coal Board and to the most recent figures of the interplay between current demand and stocks, we may be approaching a point of reasonable stability. As a Group we still sell many millions of tons of coal each year. Contrary to the belief in certain quarters, the margin of profit is very slender, especially in large wholesale transactions, but the sum total of income represented by our coal business is most important to us. While we are constantly replacing and improving such plant as we possess in Group Companies for the receipt, screening, and transport of coal, you will not be surprised to hear that this is a side of the Group's business in which we are not currently involved in large-scale capital development or investment. Not that we should shrink from such expenditure as and when it would be appropriate in order to hold or expand our share of the United Kingdom coal trade. One new and promising Group development in the coal sphere is the disposal, on a large scale, of ash from power stations.

We are still interested in the export of British coal although, unfortunately, the national volume of such business has fallen to a very low level In the years immediately before the Second World War, when United Kingdom coal exports were of the order of 35-40 million tons per annum, present Group Companies exported some 8 million tons a year. In 1959, the United Kingdom total was less than 4 million tons, with our own share reduced broadly in the same proportion. In present circumstances it is difficult to make even a small profit from much labour and effort. Again, however, there is some hope of improvement, though the contribution to Group profits can never be large.

International coal trading, as represented for example by our sale of American coal to Europe, is also at a low ebb. We still transact coal business inside a number of overseas countries but only in Brazil, France, and Spain (through our associated Company—Cia. General de Carbones) are we left with a reasonable level of trade and earning power.

The Report and Accounts were adopted.

ABOUT 7,000 sq. yds. of land which formed part of the original Aetna Works of Spear & Jackson, Limited, saw and garden tool makers, of Sheffield, has been sold for £70,000 to Thos. Firth & John Brown, Limited, Sheffield steelmakers. The deal also involved an exchange of land as well as boundary adjustments, which makes Spear & Jackson's works more compact, with its centre in a new four-storey building.

Concessionary Coal Problem

SHOULD miners receiving concessionary coal be entitled to comparable quantities or qualities of smokeless fuel in clean air zones? This point is argued by Mr. Will Whitehead, president of the South Wales Area of the National Union of Mineworkers in the union's monthly journal, The Miner. The NCB is willing to supply comparable qualities; the NUM wants comparable quantities.

As smokeless fuel costs from £11 to £12 a ton, the NCB's offer of an amount of smokeless fuel equal in value to the concessionary coal entitlement would mean a considerable reduction in the quantity of fuel supplied, Mr. Whitehead points out. According to the board the national average value of concessionary coal is a little over £38 a year. This would only buy 3¼ tons of smokeless fuel, says Mr. Whitehead.

The amount and price of concessionary coal varies throughout the country. In South Wales miners are entitled to up to 8¼ tons a year for which they pay 14s. a ton, including 7s. haulage. For concessionary coal sold back to the NCB a price of £2 7s. 3d. per ton is paid.

Colliery Clerks' Revolt Over "Anti-Social" Computer

CLERKS employed on an electronic computer at Chatterley Whitfield Colliery (Staffs) have criticized the device on the ground that it has introduced "anti-social conditions" into their work. A joint statement issued last Friday on behalf of the North Staffordshire Colliery branch of the Clerical and Administrative Workers' Union and the North Staffordshire Area of the NUM Colliery Officials and Staffs Association, says that conditions have become "intolerable" and are to be raised with the National Coal Board.

The clerks complain that since the introduction of the computer, they have had to comply with abnormal hours of work, including Saturday morning and excessive overtime and weekend work. It was thought that the computer would have enabled all clerical staff to have enjoyed a five-day week, but time off in lieu of overtime work had reached such proportions that they were unable to have the time off due to them. The clerks contend that overtime should now be paid for.

Yorkshire Miners Leave Pit After Fatality

BECAUSE a workmate had been fatally injured 500 men walked out of the pit at Cadeby Colliery (Yorks), on Monday. Recently men at the neighbouring Kilnhurst Colliery did the same. In both cases it has been claimed that the men's action was a breach of an agreement with the NCB in which the board agrees to pay the benefits to the widow after a fatality providing the men remain at work.

Mr. W. H. Sales, chairman of the North-Eastern Divisional Coal Board is considering the matter and a divisional spokesman said the board was having seriously to consider what action to take over breaches of the agreement.

The miner who was killed was Mr. Terence Calladine. After firing some shots he went back to check and was trapped under a roof fall.

Miners' New Pay Claim

NEW wage claim is to be presented to the National Coal Board by the National Union of Mineworkers. Only the amount and timing were left unsettled at a meeting of the union's national negotiating committee in London on Thursday of last week, although a figure of 18s. a week is reported. The NUM executive is to meet next month to decide finally on the amount of the claim.

There is general dissatisfaction in the union with the recent arbitration awards of another 5s. a week and a reduction of one hour in the working week. The NUM had asked for 12s. and a reduction of 2½ hours. Some 350,000 day-wage men would be affected by the new claim, but any settlement would lead to improvements in pieceworkers' pay as well. The present minimum rates, including the recent 5s. award, are £9 2s. 6d. for surface workers and £10 2s. 6d. for underground men.

Nottinghamshire Area council of the NUM decided at Mansfield on Saturday to press the union's national executive to seek a further rise of £1 week. Mr. Jack Tighe, the Area president, said: "Our day-wage men are scandalously underpaid, and that goes for the craftsmen too." He criticized the Government for not bearing the cost of stocking coal, and responsibility for imports of American coal.

The Area council also called for the union, in conjunction with the TUC and the Labour Party, to urge closer liaison between the home power industries, coal, gas, and electricity, to bring about an improved economic policy.

Price Trouble in Campaign for More Miners' Helmets

VARIATION in the price from pit to pit of safety helmets has annoyed miners employed by the North-Eastern Divisional Coal Board, which has started an intensive campaign to get every miner to wear a safety helmet. Management and union officials are pressing for the helmet to become compulsory, but the difference in cost has raised difficulties. The helmets are reported to vary in cost between 1s. 6d. and 4s. 10d. each.

Mr. Sam Bullough, president of the Yorkshire Area of the National Union of Mineworkers, said last week: "This difference in cost has been brought to our attention, and we are looking into it. I think that a safety hat is protective clothing, and there should be no charge. A man is issued with one free, but has to pay for the replacement."

Returns showing how many men wear safety hats have been sent to the Doncaster headquarters of the North-Eastern Division. Miners with large or odd-shaped heads, who have never been able to wear a safety helmet because they could not get one to fit them, are being specially fitted. A NCB official said that so far returns showed that about 90 to 95 per cent. of the 137,000 miners at 108 Yorkshire pits were wearing helmets. "We are looking into the price," he added.

HOPE HAS BEEN abandoned for 67 miners trapped in a coal mine at Kawasaki, in Southern Japan, when a river bed gave way on Tuesday under the force of torrential rain. Sixty men got out in time, and one said the river was "pouring in like a waterfall."

Board Changes

BICC Changes in Directorate

A NUMBER of changes in the board of BRITISH INSULATED CALLENDER'S CABLES, LIMITED, became effective on Monday. Appointed assistant managing director of the company is Mr. W. C. Handley, previously director (home group co-ordination). Earlier this year Mr. Handley was appointed chairman of the new company, Telcon Metals, Limited.

MR. W. C. HANDLEY

Other new assistant managing directors are Mr. H. F. Akehurst, previously director (oversea operations) and Mr. R. M. Fairfield, previously director (home operations). The three men will be responsible to Sir William McFadzean, managing director, for the day-to-day operation and administration of the company in their respective spheres.

Mr. E. Bowyer, general manager (Prescot) since December, 1958, and Mr. C. H. Broughton Pipkin, commercial manager (home), also since 1958, become executive directors. Lt.-Gen. Sir Ronald M. Scobie, who has been a director of the company since 1947, has resigned from the board.

SQUARE GRIP REINFORCEMENT COMPANY (LONDON), LIMITED—Mr. William Fraser and Mr. K. C. Griffiths, northern regional general manager, have been appointed to the board.

IMPERIAL ALUMINIUM COMPANY, LIMITED—Mr. W. Brining, Mr. J. M. Graham (directors of Almin, Limited), Mr. J. M. Mitchell, and Mr. S. W. Weyson, deputy treasurer of Imperial Chemical Industries, Limited, have been appointed directors.

ALMIN, LIMITED (Associated Light Metal Industries)—Mr. J. M. Mitchell, president of Alcoa International, and Mr. M. J. S. Clapham, joint managing director of the metals division of Imperial Chemical Industries, Limited, have been appointed directors.

VICKERS RESEARCH, LIMITED—The board has been reconstituted as follows:—Mr. A. H. Hird (chairman), Dr. C. F. Bareford (managing director), Mr. W. D. Opher, Mr. W. D. Pugh, Mr. L. Redshaw, Mr. S. P. Woodley, and Mr. R. P. H. Yapp. Mr. A. D. Read is secretary.

INTERNATIONAL NICKEL COMPANY OF CANADA, LIMITED—Mr. James H. Goss, vice-president and group executive of the General Electric Company, has been elected a director of the company. Also elected to the board is Mr. James A. Richardson, vice-president of James Richardson & Sons, Limited.

BRIGHTSIDE ENGINEERING HOLDINGS, LIMITED—Mr. L. Graham Firth has been elected deputy chairman, and Mr. R. Ivor Slater, Mr. P. Wright, and Mr. W. Cusworth have been elected to the board. Mr. Wright has also been appointed managing director of Brightside Foundry & Engineering Company, Limited, and Mr. Cusworth has been appointed managing director of Buckley & Taylor, Limited, subsidiaries of Brightside Engineering. The appointments take effect from October 1.

R. & A. MAIN, LIMITED—Mr. J. Wortley, who has been appointed managing director, joined the company's Falkirk works in 1948. He was promoted to general manager of both Edmonton and Falkirk works in 1956 and joined the board in 1958. His father, the late Mr. G. W. Wortley, was a director for a number of years.

LLANELLY STEEL COMPANY (1907), LIMITED—Mr. John L. M. Bevan, who was appointed a director in August, will take up the duties of works director from October 1. He is at present managing director of Baglan Engineering Company (1919), Limited, and a director of other companies in the Duport, Limited, group.

Coal from Allerdean After 52 Years

COAL was brought to the surface for the first time since June, 1908, at the Allerdean Drift Mine, near Berwick, on Thursday of last week. The occasion marked the successful conclusion of the struggle to preserve mining in the locality after the neighbouring Blackhill Colliery was closed down in February, 1959.

After considerable negotiations the NCB granted a concessionary private mines licence to the Elsdon Colliery Company, Limited, and 20 of the 200 Blackhill miners who were rendered redundant have re-opened the drift.

Their leader, Mr. Tom Gibson, now manager of Allerdean, forecasting that as production increased more miners would be employed, said that the coal won was of a higher grade than that mined at Blackhill. Non-stop pumping operations since June have cleared the drift of flood water and the workings have found to be in good order and the coal face hard. The seam is over 3 ft. thick, divided by an inch band of stone. The present face is about 300 yds. from the surface.

"Destroy this Cynicism About the Coal Industry"

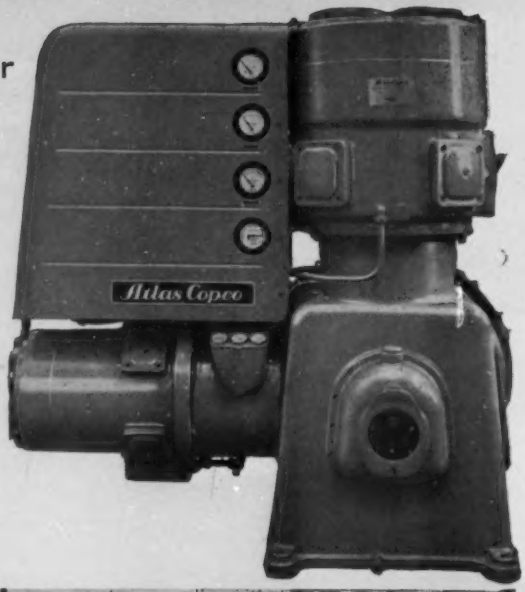
EVERY effort should be made to destroy the attitude of cynicism towards the coal industry, said Mr. W. W. Hamilton, Labour MP for West Fife, after a three-day tour of pits in the Area last week. Mr. Hamilton said he had formed the impression that the worst was over for the industry in Scotland, and there was the prospect that it could now take on every fit boy it could get. There was a stronger feeling of optimism among officials, and more use of publicity machinery should be made to put this feeling across.

Mr. Hamilton, with Mr. Harry Gourlay, Labour MP for Kirkcaldy Burghs, visited Seafield and Rothes collieries. Later they went to Bowhill Colliery where they met Mr. L. R. Milligan, deputy chairman of the Scottish Divisional Coal Board. Mr. Hamilton also visited Valleyfield Colliery. At all four he had talks with mine officials and representatives of the National Union of Mineworkers.

AMERICAN electronics firm, Beckman Instruments, Limited, which was established at Glenrothes, near Glasgow, in 1958, is planning a major expansion of its factory there.

Here's Air Power at ROCK BOTTOM cost

ER6 Heavy-Duty Compressor for reliable 3-shift operation



Atlas Copco's ER6 compressor delivers air at the lowest possible cost. Designed to incorporate *every* economy factor, it combines the lowest possible running costs with low installation costs and a space saving design.

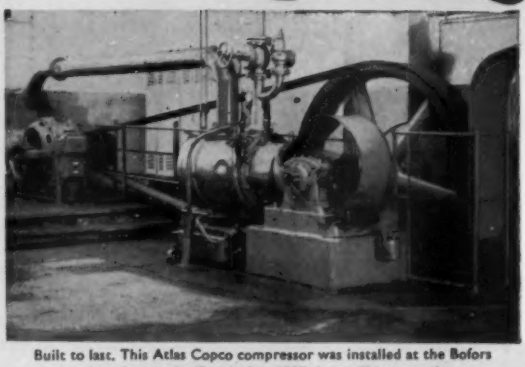
The ER6 delivers 1,075 cfm at 100 psi (30.4m³/min at 7 kg/cm²) for a power consumption that is absolutely rock bottom. Thanks to a new type of intercooler, water consumption is only 440 imperial gallons (2,000 litres) per hour—a *quarter* the consumption of most similar machines. The ER6 is compact. Occupying only half the space usually required for machines of its capacity, it saves expensive factory space. In addition, installation costs are lower as new, cheaper installation methods are employed.

RANGE OF STATIONARIES

From 2.5 to 20,000 cfm, there is an Atlas Copco stationary compressor to suit every requirement. Whatever the design factor—compactness, low installation cost, low operating cost, or a combination of all three—Atlas Copco stationaries are high-performance machines you can rely on.

Sales and Service in Ninety Countries

Represented in ninety countries, Atlas Copco is the world's largest organisation specialising solely in compressed air equipment. Products include stationary and portable compressors, rock drills, loaders, hoists, air tools and paint-spraying equipment. Wherever you are, the international Atlas Copco group offers expert advice and provides a complete after-sales service.



Built to last. This Atlas Copco compressor was installed at the Bofors engineering works (Sweden) in 1907. It is still in operation.

WRITE FOR THE LEAFLET Leaflet E1127 gives full details of the ER6 compressor. Write for a copy to your local Atlas Copco company or agent or to the address at the foot of this advertisement.

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S.168

French Plan to Cut Back Coal Production

REFORM programme to deal with over-production in the French coal mining industry is being prepared by the French Government. The situation has grown worse in France in recent months. The drop in coal sales, due to the change in energy requirements of industry, struck in France later than in other coal-producing countries. In contrast to Belgium and Germany, France has no longe-term delivery contracts with American exporters. Coal stocks in continental Europe have been almost halved since the beginning of this year, but have continued to rise in France. While stocks at the pits in the whole of continental Europe fell again by 500,000 tons to 31,200,000 tons by the end of August, they increased in France to more than 13,000,000 tons.

In the central and southern mines of the country and in the east (Lorraine) the situation is particularly bad, whereas the more productive northern coal mines have succeeded in developing other outlets. While the French railroads and some industries bought less coal, the northern pits sold more of their output to electricity works. The northern coal industry will also gain an important new consumer when in a year's time the new steel mills of the Société Dunkerquoise de Sidérurgie will go into production to consume more than 1,000,000 tons of coke by 1962-63.

In the other French coal districts, however, the Government will apply its original reform plan which aims at closing the unproductive mines in the central and southern coal regions. Total French coal production, now about 60,000,000 tons a year, will be cut back to 53,000,000 tons by 1965, and this year the output of the mines will probably be between 57,000,000 and 58,000,000 tons.

The State plans to spend during 1961 about NF 150,000,000 to help the unprofitable coal mines to reduce their output, convert some of their installations to other activities, and retrain surplus workers, and some of the miners will be retired earlier than had been foreseen. The Government also plans to set up a new financial company—Société pour le Dévelopement Industriel et Commercial—to aid the mines and to extend credits to new industries to be set up in former coal districts. The miners' union, however, has so far refused to accept Government proposals to move jobless miners to other work.

New Factory for Simplex Dairy Equipment

NEW £100,000 factory of the Simplex Dairy Equipment Company, Limited, Sawston (Cambs) has been officially opened by Lady Gamage, wife of Sir Leslie Gamage, chairman of the General Electric Company, Limited. The company, which is a member of the GEC group, is now under one roof for the first time. Before the move it had three offices, three works, and six stores, all in different parts of Cambridge.

The company makes a wide range of dairy and agricultural products and fabricates tubular steel for agricultural purposes. It plans to expand into industrial tubular metal equipment.

BRITISH ELECTRIC TRACTION COMPANY, LIMITED—Mr. W. T. James is to retire from the board at the end of the year.

Suggestion Schemes Are Not "Welfare Gimmicks"

BRITAIN loses £20,000,000 a year because there are insufficient and inadequate industrial suggestion schemes in operation and for the same reason industrial relations are not as good as they could be. Mr. P. Clavell Blount made this claim at a meeting arranged by the British Productivity Council at Chelmsford on Thursday of last week.

This country, he maintained, had inventive genius, production know-how, and a manufacturing ability as good as that of any nation, yet its average rate of productivity increase was about 1½ per cent. over the past 60 years, compared with 3 per cent. in the United States.

Mr. Blount criticized the "tradition" still widely held that the production of new ideas was the prerogative of those at the top—people in the lower ranks were not paid to think. For this reason, he said, and because of widespread apathy, complacency, and resistance to change, millions of ideas were stillborn or wasted. Suggestion schemes were no welfare gimmicks. A formal suggestion scheme became essential when an organization grew to a size where immediate and personal contact between the top man and those in the rank and file was no longer practical.

More Export Orders for Wild-Barfield

AMONG equipments being manufactured by Wild-Barfield Electric Furnaces, Limited, Watford (Herts) for oversea customers are nearly 50 furnaces for India, varying from small muffles for laboratory and technical school use to large equipments for full-scale production applications. Included in export orders to Belgium is one for a Wild-Barfield/NRC Model 2801 C crystal pulling furnace, while an order has also been received for a large high-temperature furnace for the Royal New Zealand Air Force.

In addition to laboratory and toolroom equipment being manufactured for Canada by Wild-Barfield, five special kilns and a large glass annealing lehr are being made by the Applied Heat Company, Limited, a Wild-Barfield subsidiary.

CAPITAL EXPENDITURE RISES BY 18 PER CENT.

FIXED capital expenditure by manufacturing industry is provisionally estimated by the Board of Trade to have been 18 per cent. higher in the second quarter of this year than in the same period last year.

Expenditure on building in manufacturing rose by £18,000,000 (39 per cent.) and on plant and machinery by £13,600,000 (10 per cent.), compared with the second quarter of 1959.

The wholesale price index of basic materials used in manufacturing industry has been provisionally estimated for August at 97.5 (1954 = 100). The average price level of these materials fell by 2 per cent. over the past two months.

THE Confederation of Shipbuilding and Engineering Unions is to meet the engineering employers on Wednesday and the shipbuilding employers on Thursday for wage talks.

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